(FACTORY) 1551

CARDION
TEST SET

Mick,
Any use?
If not please
throw away.

CARDION

CRF - 2

TEST SET

MP MASTER
MA23527

SECTION VI

ILLUSTRATED PARTS BREAKDOWN

6-1 GENERAL

This Illustrated Parts Breakdown illustrates and lists the assemblies and parts necessary for maintenance of the SSR Interrogator-RF Test Set. The equipment is designed and manufactured by Cardion Electronics, Woodbury, L.I., New York 11797.

6-2 ILLUSTRATIONS

Each illustration shows the location of the electrical and mechanical parts. The electrical parts are identified in accordance with MIL-STD-16; the mechanical parts have also been assigned a designation (MP).

6-3 PARTS LIST

Each assembly is listed in reference designation sequence. The parts are shown in the associated illustration and located by the reference designation.

6-4 USABLE ON CODE

When two or more types of assemblies are listed in one list, usable on code (UOC) letters are included to indicate assembly differences. The codes used in one list have no relation to codes used in another list. The absence of a code in the column indicates that parts are common to all assemblies within the list.

6-5 MANUFACTURERS CODE

The manufacturer's code is the five-digit code, which was obrained from the Federal Supply Code for Manufacturers, Cataloging Handbook H4-1 and is provided as follows:

CODE	MANUFACTURER'S NAME AND ADDRESS
12909	Cardion Electronics Long Island Expressway Woodbury, N. Y. 11797
81349/96906	Military Specifications/Standards Pomulgated by Standardization Div. Directorate of Logistic Services DSA

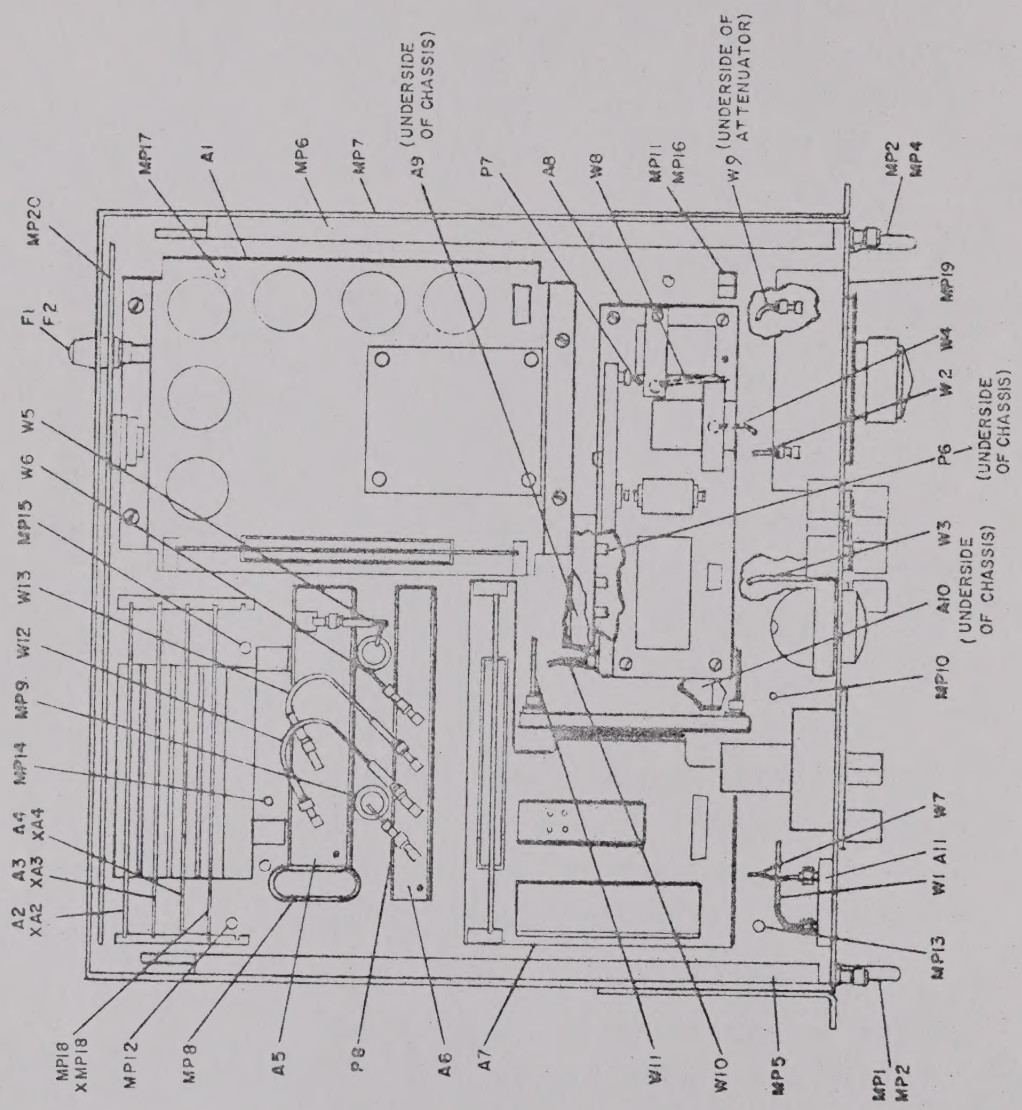
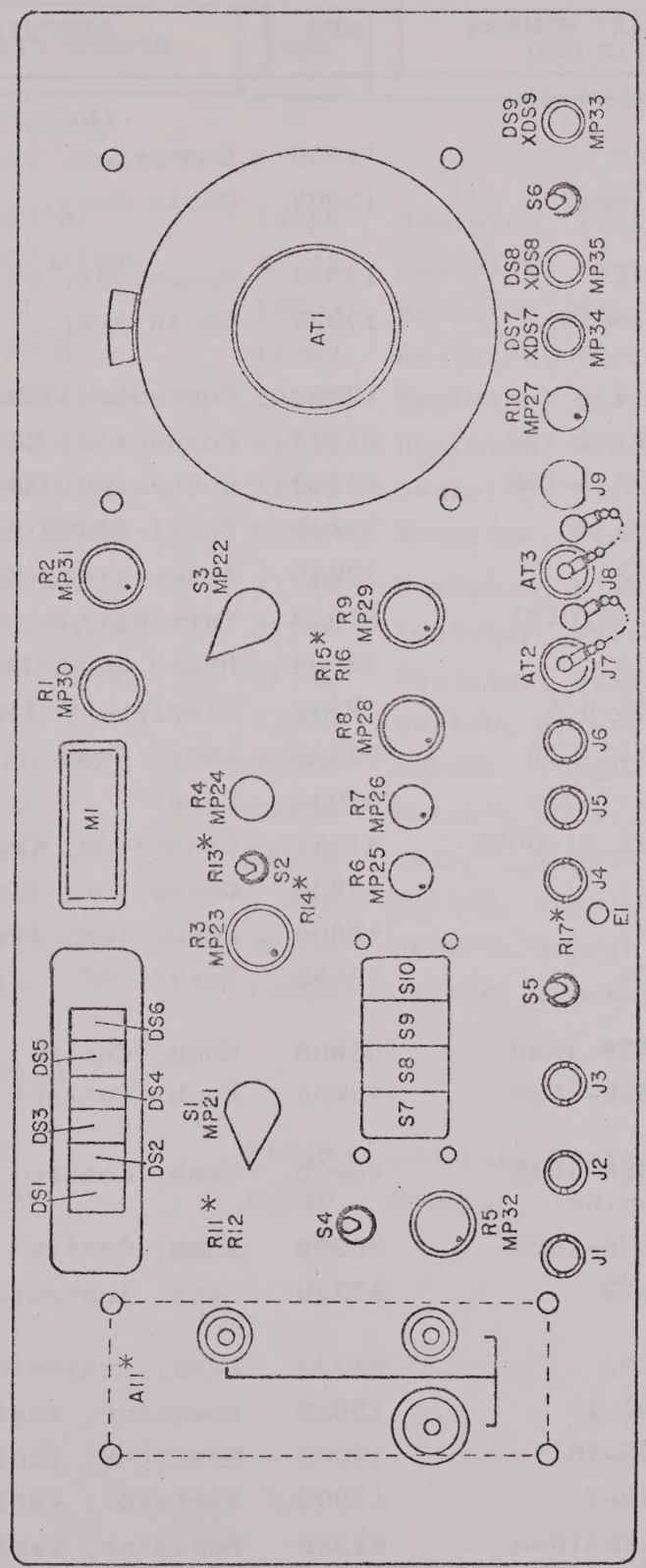


Figure 6-1. SSR Interrogator-RF Test Set, Unit 60 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60	102597	12909	SSR Interrogator-RF Test Set (Figure 6-1)	
A1	101897G4	12909	Power Supply (Figure 6-4)	
A2	102052	12909	Filter/PS Brd Assy (Figure 6-6)	
A3	102599	12909	Coder Board Assy (Figure 6-7)	
A4	102053	12909	Freq Ctr Board Assy (Figure 6-8)	
A5	102190	12909	Lo/VCO Module (Figure 6-9)	
A6	102196	12909	Ctr-Prescaler Module (Figure 6-12	
A7	102198	12909	Signal Generator (Figure 6-14)	
A8	102205	12909	Marker Generator (Figure 6-22)	
A9	102317	12909	Broadband Detector (Figure 6-26)	
A10	102318	12909	Preselector/Mixer (Figure 6-28)	
A11	102319	12909	Broadband Coupler (Figure 6-29)	
F1-2	F02B250V1A	81349	Fuse	
MP1-2	MS39087-3	96906	Handle, bow brass	
MP3-4	10270-1	12909	Ferrule	
MP5	503890-2	12909	Bracket, slide L.H.	
MP6	503890-1	12909	Bracket, slide L.H.	
MP7	503871	12909	Enclosure case	
MP8	MS21266-3	96906	Grommet Plastic	
MP9	E2197	12909	Grommet Rubber	
MP10	10017-1	12909	Terminal Ground	
MP11	10031-4	12909	Clamp, Loop	
MP12	10031-6	12909	Clamp, Loop	
MP13	10031-5	12909	Clamp, Loop	
MP14-15	10031-2	12909	Clamp, Loop	
MP16-17	10031-1	12909	Clamp, Loop	
MP18	101892	12909	Extender	
MP19	102598	12909	Assy Front Panel (Figure 6-2)	
MP20	102291	12909	Panel Rear (Figure 6-3)	
P1	M24308/2-1	81349	Connector	
P2	M24308/2-2	81349	Connector	
P3	M24308/2-3	81349	Connector	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60	(Continued)			
P4	M24308/2-1	81349	Connector	
P5	M24308/2-2	81349	Connector	
P6	402948	12909	Connector	
P7	402949	12909	Connector	
P8	402948	12909	Connector	
W1	102750	12909	Cable Assy.	
W1P1	403312	12909	Connector, SMA	
W2	102747	12909	Cable Assy.	
W2P1	403312	12909	Connector, SMA	
W3	102416G3	12909	Cable Assy.	
W3P1	402948	12909	Connector, SMA	
W4	102416G4	12909	Cable Assy.	
W4P1	402948	12909	Connector, SMA	
W4P2	402949	12909	Connector, SMA	
W5	102416G5	12909	Cable Assy.	
W5P1,P2	402948	12909	Connector, SMA	
W6	102416G6	12909	Cable Assy.	
W6P1	402948	12909	Connector, SMA	
W6P2	402949	12909	Connector, SMA	
W7	102416G7	12909	Cable Assy.	
W7P1,P2	402949	12909	Connector, SMA	
W8	102416G8	12909	Cable Assy.	
W8P1	402948	12909	Connector, SMA	
W8P2	402949	12909	Connector, SMA	
W9	102746	12909	Cable Assy.	
W9P1	403311	12909	Connector, SMA	
W9P2	403312	12909	Connector, SMA	
W10	102416G10	12909	Cable Assy.	
W10P1, P2	402949	12909	Connector, SMA	
W11	102416G11	12909	Cable Assy.	



*A11, R11, R12, R13, R14, R15, R16 AND R17 ARE ON REAR OF PANEL

Figure 6-2. Front Panel Assembly 60MP19 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60	(Continued)			
W11P1, P2	402949	12909	Connector, SMA	
W12	102416G12	12909	Cable Assy.	
W12P1, P2	402948	12909	Connector, SMA	
W13	102416G13	12909	Cable Assy.	
W13P1, P2	402948	12909	Connector, SMA	
XA2-XA4	M21097/1-199	81349	Connector, Electrical	
XMP18	M21097/1-199	81349	Connector, Electrical	
60MP19	102598	12909	Front Panel Assembly (Figure 6-2)	
AT1	402383	12909	Attenuator, Variable	
AT2,AT3	MX-554A/U-51	81349	Termination, 50 ohm	
A11	102319	12909	Broad Band Coupler (Figure 6-29)	
DS1-DS6	402456-636	12909	Display, Solid State	
DS7-DS8	MS25252-C7A	96906	Lamp, Neon	
DS9	MS25237-328	96906	Lamp	
J1-J6	M39012/21-0003	81349	Connector, Coaxial	
J7-J8	403657	12909	Connector, Plug, BNC	
J9	402833	12909	Connector, Plug, BNC	
M1	402454	12909	Meter, DC	
MP21, MP22	MS91528-1K2B	96906	Knob, Control	
MP23	MS91528-1E2B	96906	Knob, Control	
MP24-MP27	MS91528-1E1B	96906	Knob, Control	
MP28-MP32	MS91528-1E2B	96906	Knob, Control	
MP33	LC12WT2	81349	Lens, Indicator Light	
MP34, MP35	LC13CN2	81349	Lens, Indicator Light	
R1	402455-1	12909	Resistor, Variable	
R2	402455-10	12909	Resistor, Variable	
R3	402455-2	12909	Resistor, Variable	
R4	RV6NAYSA103A	81349	Resistor, Variable	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60MP19	(Continued)			
R5	402455-4	12909	Resistor, Variable	
R6	RV6NAYSA103A	81349	Resistor, Variable	
R7	402821	12909	Resistor, Variable	
R8,R9	402455-2	12909	Resistor, Variable	
R10	RV6NAYSA102A	12909	Resistor, Variable	
R11	RCR07G821JS	81349	Resistor, Fixed	
R12	RCR07G101JS	81349	Resistor, Fixed	
R13	RCR07G183JS	81349	Resistor, Fixed	
R14,R15	RCR07G102JS	81349	Resistor, Fixed	
R16	RCR07G331JS	81349	Resistor, Fixed	
R17	RCR07G103JS	81349	Resistor, Fixed	
S1	402452	12909	Switch, Rotary	
S2	MS27716-23	96906	Switch, Toggle	
S3	402453	12909	Switch, Rotary	
S4	MS27716-21	96906	Switch, Toggle	
S5	402831	12909	Switch, Toggle	
S6	MS27717-23	96906	Switch, Toggle	
S7-S10	403318	12909	Switch, Thumbwheel	
XDS1-XDS6	Not Used			
XDS7 XDS8	LH74/1	81349	Housing, Indicator Light	
XDS9	LH73/1	81349	Housing, Indicator Light	

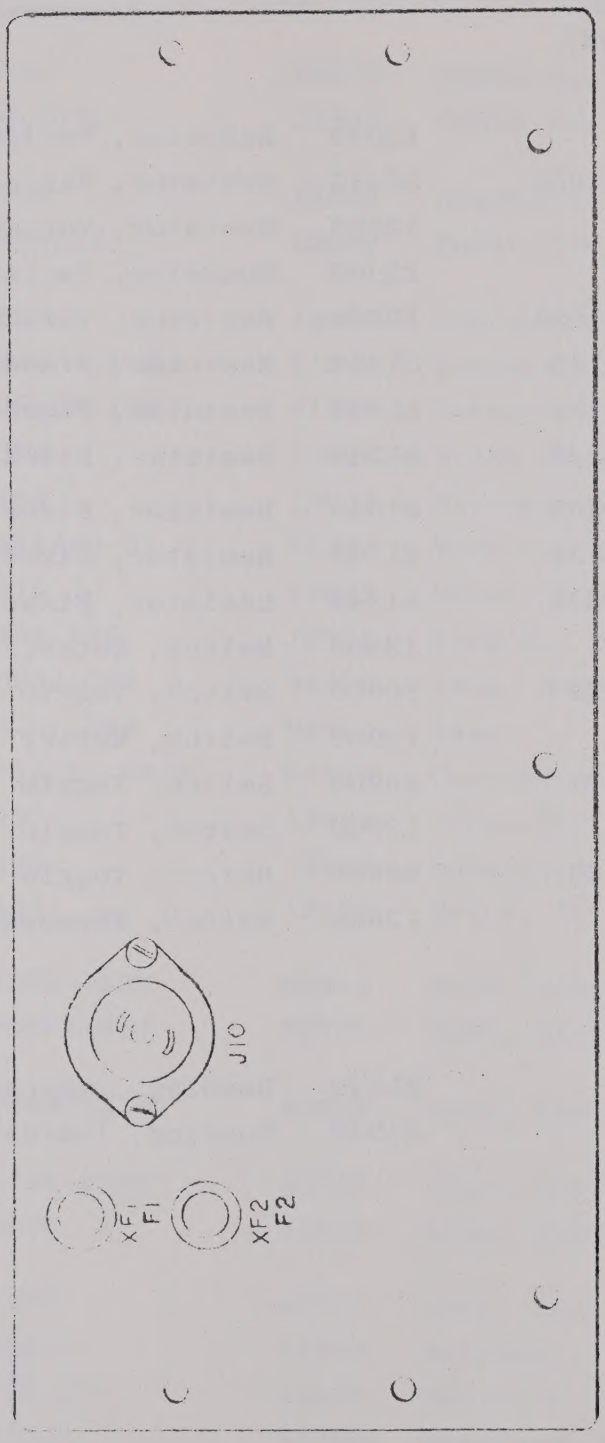


Figure 6-3. Rear Panel Assembly 60MP20 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60	(Continued)			
60MP20	102291	12909	Rear Panel (Figure 6-3)	
F1,F2	F02B250V1A	81349	Fuse	
J10	402017	12909	Connector	
XF1,XF2	FHN26G2	81349	Fuseholder	

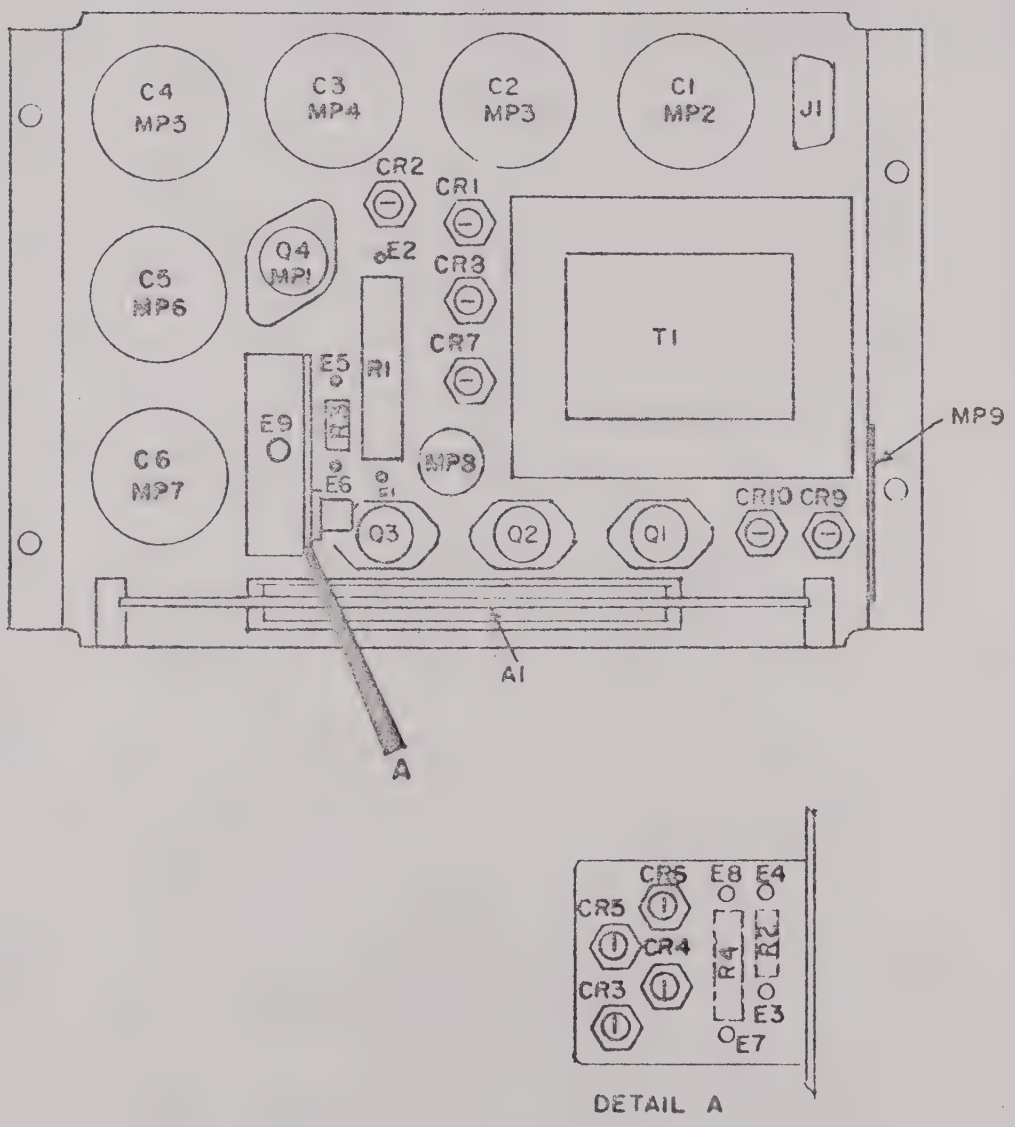


Figure 6-4. Power Supply 60A1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A1	101897G4	12909	Power Supply (Figure 6-4)	
A1	101939	12909	Power Board (Figure 6-5)	
C1,C2	CE71C113E	81349	Capacitor, Fixed	
C3	CE71C162G	81349	Capacitor, Fixed	
C4	CE71C622E	81349	Capacitor, Fixed	
C5,C6	CE71C162G	81349	Capacitor, Fixed	
CR1-CR8	1N1202A	81349	Diode	
CR9,CR10	1N2970B	81349	Diode	
E1-E8	4250-1	12909	Terminal, Standoff	
E9	502488	12909	Terminal, Lug	
MP1	10480	12909	Insulator, Transistor	
MP2-MP7	503230	12909	Clamp, Capacitor	
MP8	452	12909	Grommet, Rubber	
MP9	10434	12909	Plate, Instruction	
Q1-Q3	2N1485	81349	Transistor	
Q4	2N1490	81349	Transistor	
R1	RW68VR39	81349	Resistor, Fixed	
R2	RW69V2R2	81349	Resistor, Fixed	
R3	RW69V2R7	81349	Resistor, Fixed	
R4	RW67V102	81349	Resistor, Fixed	
T1	402589	12909	Transformer	

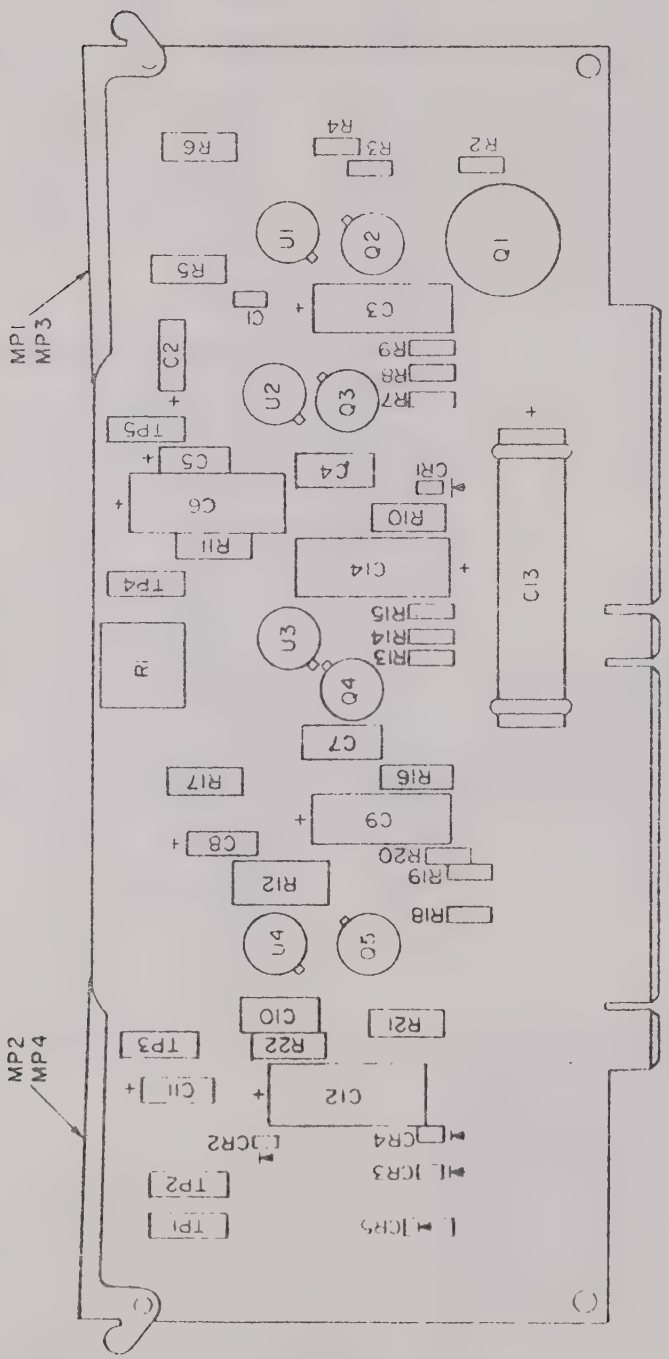


Figure 6-5. Power Board 60A1A1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UCC
60A1A1	101939	12909	Power Board (Figure 6-5)	
C1	CK05BX102M	81349	Capacitor, Fixed	
C2	M39003/01-2255	81349	Capacitor, Fixed	
C3	M39003/01-2262	81349	Capacitor, Fixed	
C4	CM05FD221J03	81349	Capacitor, Fixed	
C5	M39003/01-2255	81349	Capacitor, Fixed	
C6	M39003/01-2296	81349	Capacitor, Fixed	
C7	CK05BX102M	81349	Capacitor, Fixed	
C8	M39003/01-2255	81349	Capacitor, Fixed	
C9	M39003/01-2262	81349	Capacitor, Fixed	
C10	CM05FD221J03	81349	Capacitor, Fixed	
C11	M39003/01-2255	81349	Capacitor, Fixed	
C12	M39003/01-2296	81349	Capacitor, Fixed	
C13	M39018/01-0730	81349	Capacitor, Fixed	
C14	M39003/01-2278	81349	Capacitor, Fixed	
CR1-CR4	1N3611	81349	Diode	
CR5	1N974B	81349	Diode	
MP1, MP2	10438-1	12909	Handle, Ejector	
MP3, MP4	10439-1	12909	Rivet, Special	
MP5-MP8	401335	12909	Pad, Transistor	
Q1	2N1485	81349	Transistor	
Q2-Q5	2N2905A	81349	Transistor	
R1	RT22CP102	81349	Resistor, Variable	
R2	RCR07G221JS	81349	Resistor, Fixed	
R3	RCR07G471JS	81349	Resistor, Fixed	
R4	RCR07G182JS	81349	Resistor, Fixed	
R5	RN60D6041F	81349	Resistor, Fixed	
R6	RN60D2941F	81349	Resistor, Fixed	
R7	RCR07G101JS	81349	Resistor, Fixed	
R8	RCR07G181JS	81349	Resistor, Fixed	
R9	RCR07G182JS	81349	Resistor, Fixed	
R10	RN60D1402F	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A1A1	Continued			
R11	RN60D2211F	81349	Resistor, Fixed	
R12	RW69V2R2	81349	Resistor, Fixed	
R13	RCR07G101JS	81349	Resistor, Fixed	
R14	RCR07G181JS	81349	Resistor, Fixed	
R15	RCR07G182JS	81349	Resistor, Fixed	
R16	RN60D6981F	81349	Resistor, Fixed	
R17	RN60D2941F	81349	Resistor, Fixed	
R18	RCR07G101JS	81349	Resistor, Fixed	
R19	RCR07G181JS	81349	Resistor, Fixed	
R20	RCR07G182JS	81349	Resistor, Fixed	
R21	RN60D1402F	81349	Resistor, Fixed	
R22	RN60D2211F	81349	Resistor, Fixed	
TP1-TP5	M39024/11-01	81349	Connector, Electrical Test Point	
U1-U4	401645	12909	Integrated Circuit	

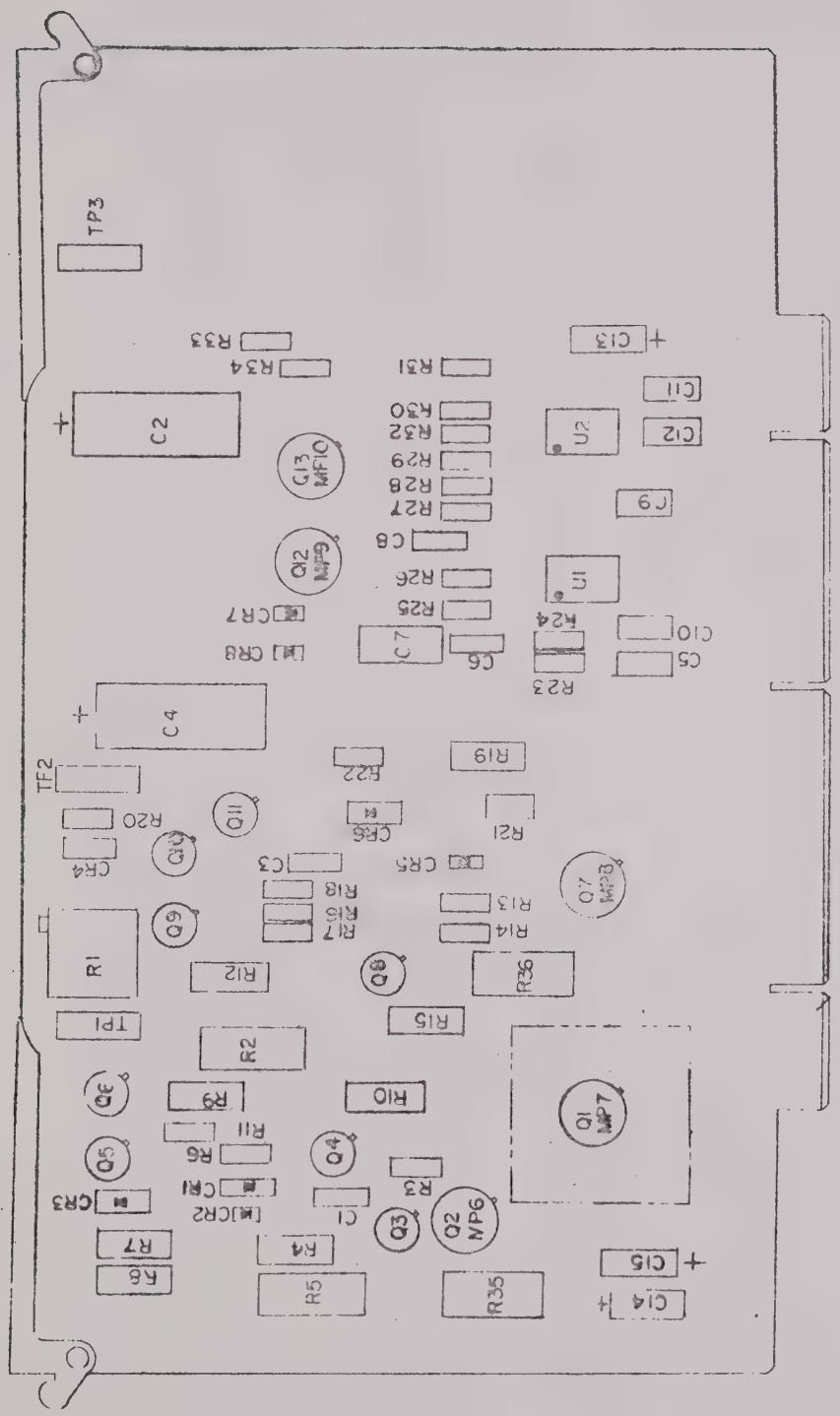


Figure 6-6. Filter/Power Supply Card 60A2 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A2	102052	12909	Filter/Power Supply Card (Figure 6-6)	
C1	CK06BX103M	81349	Capacitor, Fixed	
C2	M39003/01-2422	81349	Capacitor, Fixed	
C3	CK06BX103M	81349	Capacitor, Fixed	
C4	M3900/01-2422	81349	Capacitor, Fixed	
C5	CK06BX473M	81349	Capacitor, Fixed	
C6	CK06BX152M	81349	Capacitor, Fixed	
C7	CM05FD221J03	81349	Capacitor, Fixed	
C8	CK06BX332M	81349	Capacitor, Fixed	
C9-C12	CK06BX103M	81349	Capacitor, Fixed	
C13	M39003/01-2255	81349	Capacitor, Fixed	
C14,C15	M39003/01-2284	81349	Capacitor, Fixed	
CR1	1N968B	81349	Diode	
CR2	1N4148	81349	Diode	
CR3	1N752A	81349	Diode	
CR4	1N968B	81349	Diode	
CR5	1N4148	81349	Diode	
CR6	1N752A	81349	Diode	
CR7,CR8	1N4148	81349	Diode	
MP1-2	10438-1	12909	Handle, Ejector	
MP3-4	10439-1	12909	Rivet, Special	
MP5	504072	12909	Heat Sink	
MP6-10	10436	12909	Pad, Transistor	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A2 Continued				
Q1	2N1434	81349	Transistor	
Q2	2N1893	81349	Transistor	
Q3-Q6	2N2222A	81349	Transistor	
Q7	2N1434	81349	Transistor	
Q8-Q11	2N2222A	81349	Transistor	
Q12,Q13	2N1893	81349	Transistor	
R1	RT22C2P102	81349	Resistor, Variable	
R2	RCR32G270KS	81349	Resistor, Fixed	
R3	RCR07G102KS	81349	Resistor, Fixed	
R4	RCR20G103KS	81349	Resistor, Fixed	
R5	RCR32G472KS	81349	Resistor, Fixed	
R6	RCR07G182KS	81349	Resistor, Fixed	
R7-R9	RCR20G392KS	81349	Resistor, Fixed	
R10	RN60D3251F	81349	Resistor, Fixed	
R11	RCR07G122KS	81349	Resistor, Fixed	
R12	RN60D1651F	81349	Resistor, Fixed	
R13	RCR07G151KS	81349	Resistor, Fixed	
R14	RCR07G102KS	81349	Resistor, Fixed	
R15	RCR20G103KS	81349	Resistor, Fixed	
R16	RCR07G682KS	81349	Resistor, Fixed	
R17	RCR07G123KS	81349	Resistor, Fixed	
R18	RCR07G103KS	81349	Resistor, Fixed	
R19	RCR20G103JS	81349	Resistor, Fixed	
R20	RCR07G562KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A2 Continued				
R21	RCR07G222KS	81349	Resistor, Fixed	
R22	RCR07G202JS	81349	Resistor, Fixed	
R23	RCR07G102KS	81349	Resistor, Fixed	
R24-R26	RCR07G103KS	81349	Resistor, Fixed	
R27	RCR07G472KS	81349	Resistor, Fixed	
R28	RCR07G473KS	81349	Resistor, Fixed	
R29	RCR07G472KS	81349	Resistor, Fixed	
R30,R31	RCR07G102KS	81349	Resistor, Fixed	
R32	RCR07G473KS	81349	Resistor, Fixed	
R33,R34	RCR07G102KS	81349	Resistor, Fixed	
R35	RW69V680	81349	Resistor, Fixed	
R36	RW69V202	81349	Resistor, Fixed	
TP1-TP3	M39024/11-01	81349	Connector, Electrical Test Point	
U1,U2	402275-33	12909	Integrated Circuit	

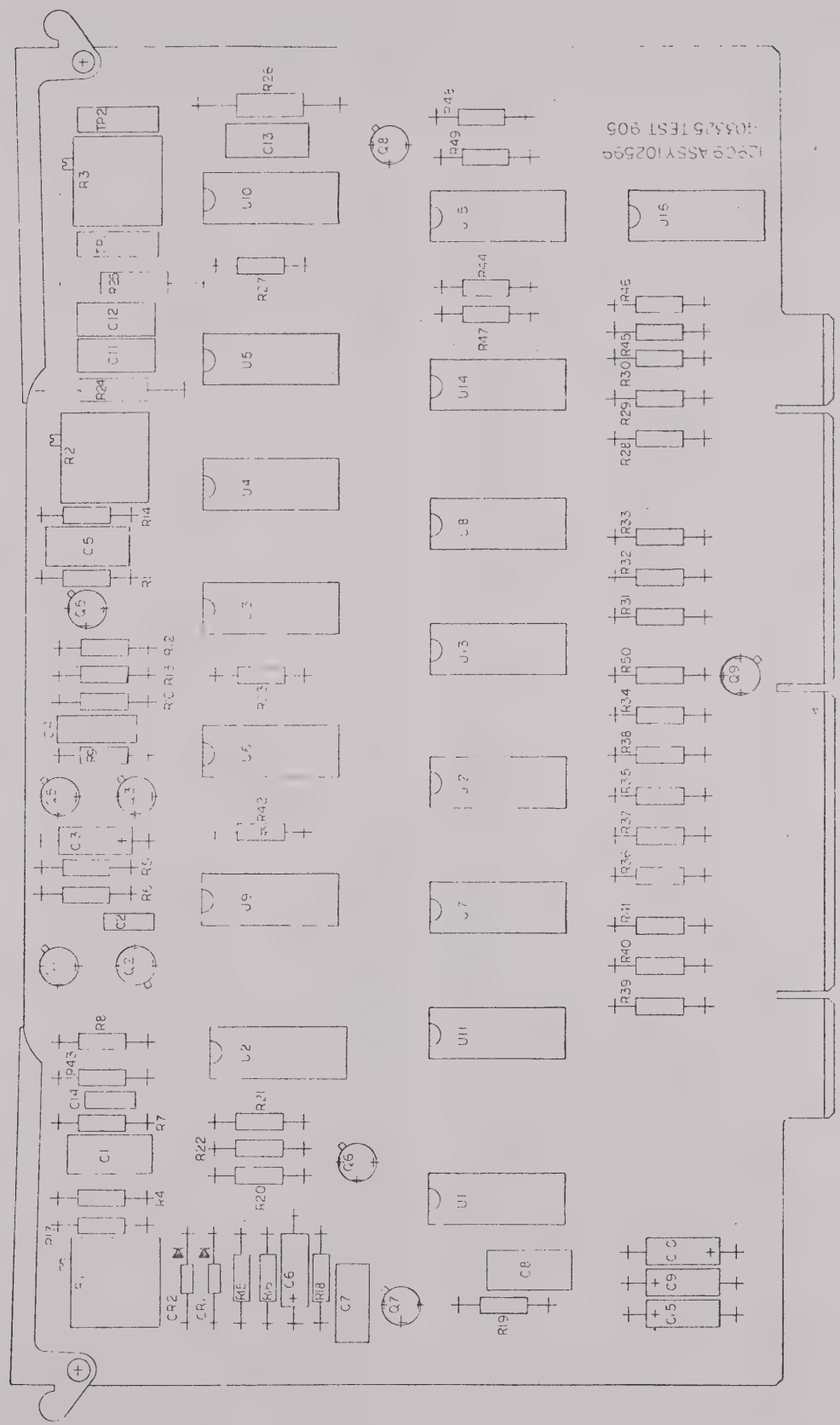


Figure 6-7. Coder Assembly 80A3 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A3	102599	12909	Coder Assembly (Figure 6-7)	
C1	CM05FD331J03	81349	Capacitor, Fixed	
C2	CK06BX103K	81349	Capacitor, Fixed	
C3	M39003/01-2283	81349	Capacitor, Fixed	
C4	CM05CD150J03	81349	Capacitor, Fixed	
C5	CM05FD391J03	81349	Capacitor, Fixed	
C6	M39003/01-2356	81349	Capacitor, Fixed	
C7	CM05ED820J03	81349	Capacitor, Fixed	
C8	CM05FD331J03	81349	Capacitor, Fixed	
C9,C10	M39003/01-2283	81349	Capacitor, Fixed	
C11,C12	CM05ED820J03	81349	Capacitor, Fixed	
C13	CM05FD121J03	81349	Capacitor, Fixed	
C14	CK06BX103K	81349	Capacitor, Fixed	
C15	M39003/01-2255	81349	Capacitor, Fixed	
CR1,CR2	JAN1N4148	81349	Diode	
MP1,MP2	10438-1	12909	Handle, Ejector	
MP3,MP4	10439-1	12909	Rivet, Special	
Q1	JAN2N3251A	81349	Transistor	
Q2-Q7	JAN2N708	81349	Transistor	
Q8,Q9	JAN2N2222A	81349	Transistor	
R1	RT22C2P202	81349	Resistor, Variable	
R2	RT22C2P103	81349	Resistor, Variable	
R3	RT22C2P502	81349	Resistor, Variable	
R4	RCR07G102KS	81349	Resistor, Fixed	
R5,R6	RCR07G472KS	81349	Resistor, Fixed	
R7	RCR07G103KS	81349	Resistor, Fixed	
R8	RCR07G471KS	81349	Resistor, Fixed	
R9	RCR07G152KS	81349	Resistor, Fixed	
R10	RCR07G472KS	81349	Resistor, Fixed	
R11	RCR07G102KS	81349	Resistor, Fixed	
R12	RCR07G681KS	81349	Resistor, Fixed	
R13	RCR07G472KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A3 (Continued)				
R14	RCR07G682KS	81349	Resistor, Fixed	
R15	RCR07G750KS	81349	Resistor, Fixed	
R16	RCR07G223KS	81349	Resistor, Fixed	
R17	RCR07G222KS	81349	Resistor, Fixed	
R18	RCR07G102KS	81349	Resistor, Fixed	
R19	RCR07G821KS	81349	Resistor, Fixed	
R20	RCR07G102KS	81349	Resistor, Fixed	
R21	RCR07G103KS	81349	Resistor, Fixed	
R22	RCR07G560KS	81349	Resistor, Fixed	
R23	RCR07G222KS	81349	Resistor, Fixed	
R24	RN60D4751F	81349	Resistor, Fixed	
R25	RN60D1002F	81349	Resistor, Fixed	
R26	RN60D2211F	81349	Resistor, Fixed	
R27	RCR07G102KS	81349	Resistor, Fixed	
R28-R41	RCR07G103KS	81349	Resistor, Fixed	
R42	RCR07G223KS	81349	Resistor, Fixed	
R43	RCR07G393KS	81349	Resistor, Fixed	
R44-R46	RCR07G472KS	81349	Resistor, Fixed	
R47	RCR07G102KS	81349	Resistor, Fixed	
R48	RCR07G472KS	81349	Resistor, Fixed	
R49	RCR07G102KS	81349	Resistor, Fixed	
R50	RCR07G103KS	81349	Resistor, Fixed	
TP1,TP2	M39024/11-01	81349	Connector, Electrical Test Point	
U1	401216-1	12909	Integrated Circuit	
U2	402275-20	12909	Integrated Circuit	
U3	401216-9	12909	Integrated Circuit	
U4,U5	402275-19	12909	Integrated Circuit	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A3 (Continued)				
U6	401216-9	12909	Integrated Circuit	
U7,U8	402275-23	12909	Integrated Circuit	
U9	402275-7	12909	Integrated Circuit	
U10	402275-19	12909	Integrated Circuit	
U11-U14	402275-1	12909	Integrated Circuit	
U15	401216-1	12909	Integrated Circuit	
U16	401216-2	12909	Integrated Circuit	

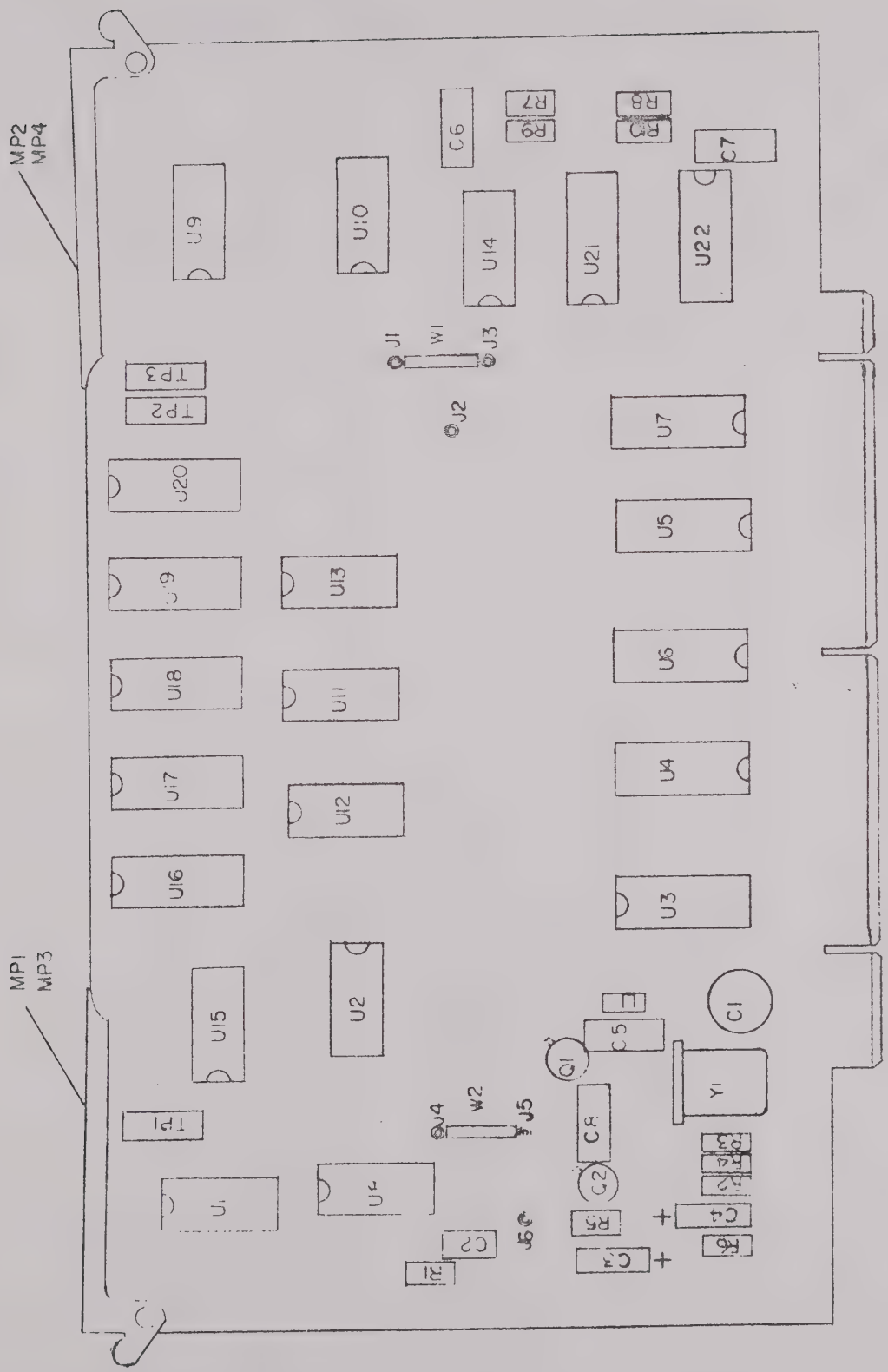


Figure 6-8. Frequency Counter 60A4 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A4	102053	12909	Frequency Counter (Figure 6-8)	
C1	CV31D350	81349	Capacitor, Variable	
C2	CK60AW1D2M	81349	Capacitor, Fixed	
C3,C4	M39003/01-2255	81349	Capacitor, Fixed	
C5	CM05CD050D03	81349	Capacitor, Fixed	
C6,C7	CM05ED820J03	81349	Capacitor, Fixed	
C8	CM05FD181J03	81349	Capacitor, Fixed	
J1-J6	401700	12909	Jack	
L1	MS75084-09	96906	Coil, Fixed RF	
MP1,MP2	10438-1	12909	Handle, Ejector	
MP3,MP4	10439-1	12909	Rivet, Ejector	
Q1,Q2	2N222A	81349	Transistor	
R1	RCR07G472KS	81349	Resistor, Fixed	
R2	RCR07G101KS	81349	Resistor, Fixed	
R3,R4	RCR07G562KS	81349	Resistor, Fixed	
R5	RCR07G102KS	81349	Resistor, Fixed	
R6	RCR07G181KS	81349	Resistor, Fixed	
R7	RCR07G472KS	81349	Resistor, Fixed	
R8	RCR07G103KS	81349	Resistor, Fixed	
R9	RCR07G472KS	81349	Resistor, Fixed	
R10	RCR07G103KS	81349	Resistor, Fixed	
TP1-TP3	M39024/11-01	81349	Connector, Electrical Test Point	
U1	401216-9	12909	Integrated Circuit	
U2	402275-2	12909	Integrated Circuit	
U3-U7	402275-36	12909	Integrated Circuit	
U8	401216-1	12909	Integrated Circuit	
U9	401216-3	12909	Integrated Circuit	
U10	401216-1	12909	Integrated Circuit	
U11	402275-5	12909	Integrated Circuit	
U12,U13	401216-9	12909	Integrated Circuit	
U14	402275-8	12909	Integrated Circuit	
U15	402275-2	12909	Integrated Circuit	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A4 (Continued)				
U16-U22	402275-36	12909	Integrated Circuit	
W1,W2	401699	12909	Link, Terminal Connecting	
Y1	CR60A/U10.0000 MHZ	81349	Crystal Unit, Quartz	

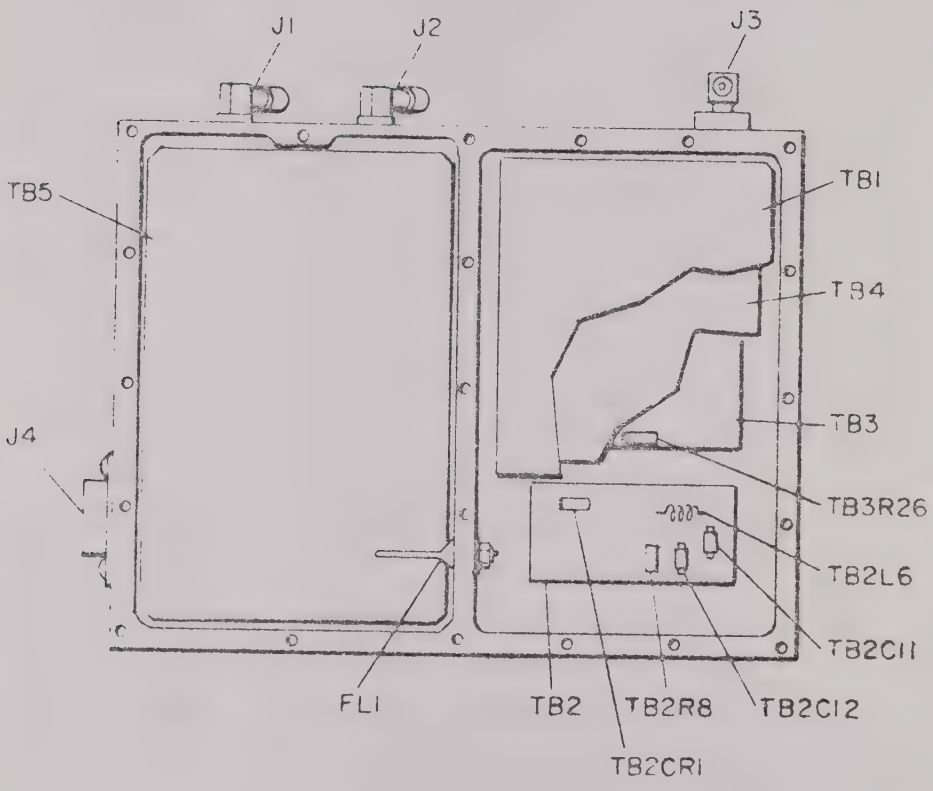


Figure 6-9. L.O./VCO Module 60A5 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UCC
60A5	102190	12909	L.O./VCO Module (Figure 6-9)	
FL1	402935	12909	Filter Connector, Feed Thru	
J1,J2	402930	12909	Jack	
J3	402931	12909	Jack	
J4	M24308/4-1	12909	Connector, Electrical	
TB1	102194	12909	Circuit Card Assy, Local Oscillator (See Figure 6-10)	
TB2	102195	12909	Stripline Assy, SRD Multr.	
TB2C11	402832-1	12909	Capacitor, Fixed	
TB2C12	402832-2	12909	Capacitor, Fixed	
TB2CR1	402663-3	12909	Diode	
TB2L6	402801	12909	Inductor	
TB2R8	RCR07G272KS	81349	Resistor, Fixed	
TB3	102192	12909	Circuit Card Assy, Filter	
TB3R26	RCR05G471KS	81349	Resistor, Fixed	
TB4	402597	12909	Board, Mating	
TB5	102191	12909	Circuit Card Assy, VCO (See Figure 6-11)	

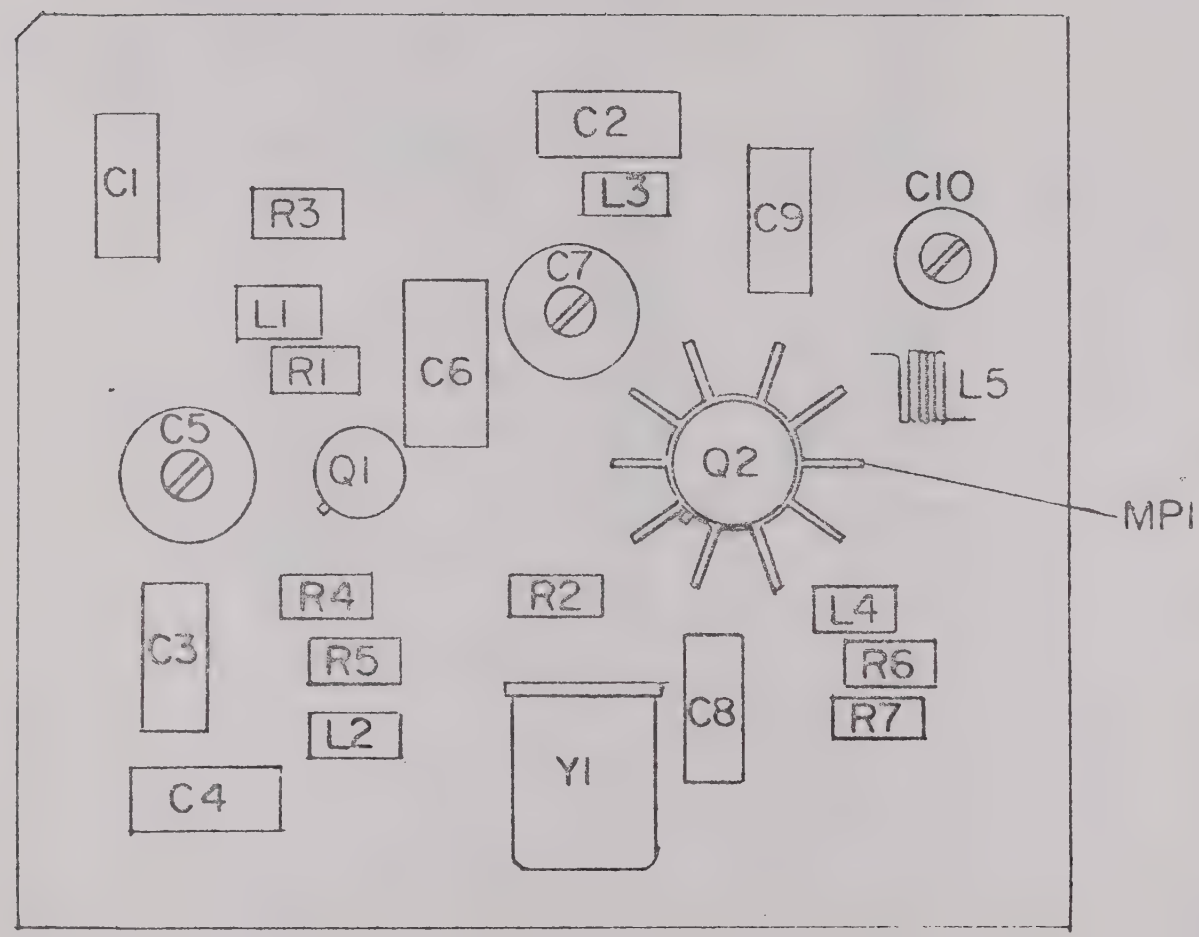


Figure 6-10. 970 MHz Local Oscillator 60A5TB1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A5TB1	102194	12909	970 MHz Local Oscillator (Figure 6-10)	
C1,C2	CM05FD391J03	81349	Capacitor, Fixed	
C3	CM05CD100D03	81349	Capacitor, Fixed	
C4	CM05ED470J03	81349	Capacitor, Fixed	
C5	CV31A180	81349	Capacitor, Variable	
C6	402094-2	12909	Capacitor, Fixed	
C7	CV31D350	81349	Capacitor, Variable	
C8	CM05FD201J03	81349	Capacitor, Fixed	
C9	CM05FD121J03	81349	Capacitor, Fixed	
C10	402927	12909	Capacitor, Variable	
L1	MS75083-03	96906	Coil, RF Molded	
L2	MS75083-04	96906	Coil, RF Molded	
L3	MS75083-05	96906	Coil, RF Molded	
L4	MS75083-11	96906	Coil, RF Molded	
L5	402928-3	12909	Coil, Air Wound	
MP1	504049	12909	Heatsink	
Q1	2N918	81349	Transistor	
Q2	2N3866	81349	Transistor	
R1	RCR07G104KS	81349	Resistor, Fixed	
R2	RCR07G223KS	81349	Resistor, Fixed	
R3	RCR07G122KS	81349	Resistor, Fixed	
R4	RCR07G330KS	81349	Resistor, Fixed	
R5	RCR07G391KS	81349	Resistor, Fixed	
R6	RCR07G121KS	81349	Resistor, Fixed	
R7	RCR07G220KS	81349	Resistor, Fixed	
Y1	CR80A/U80.833 MHz	81349	Crystal Unit, Quartz	

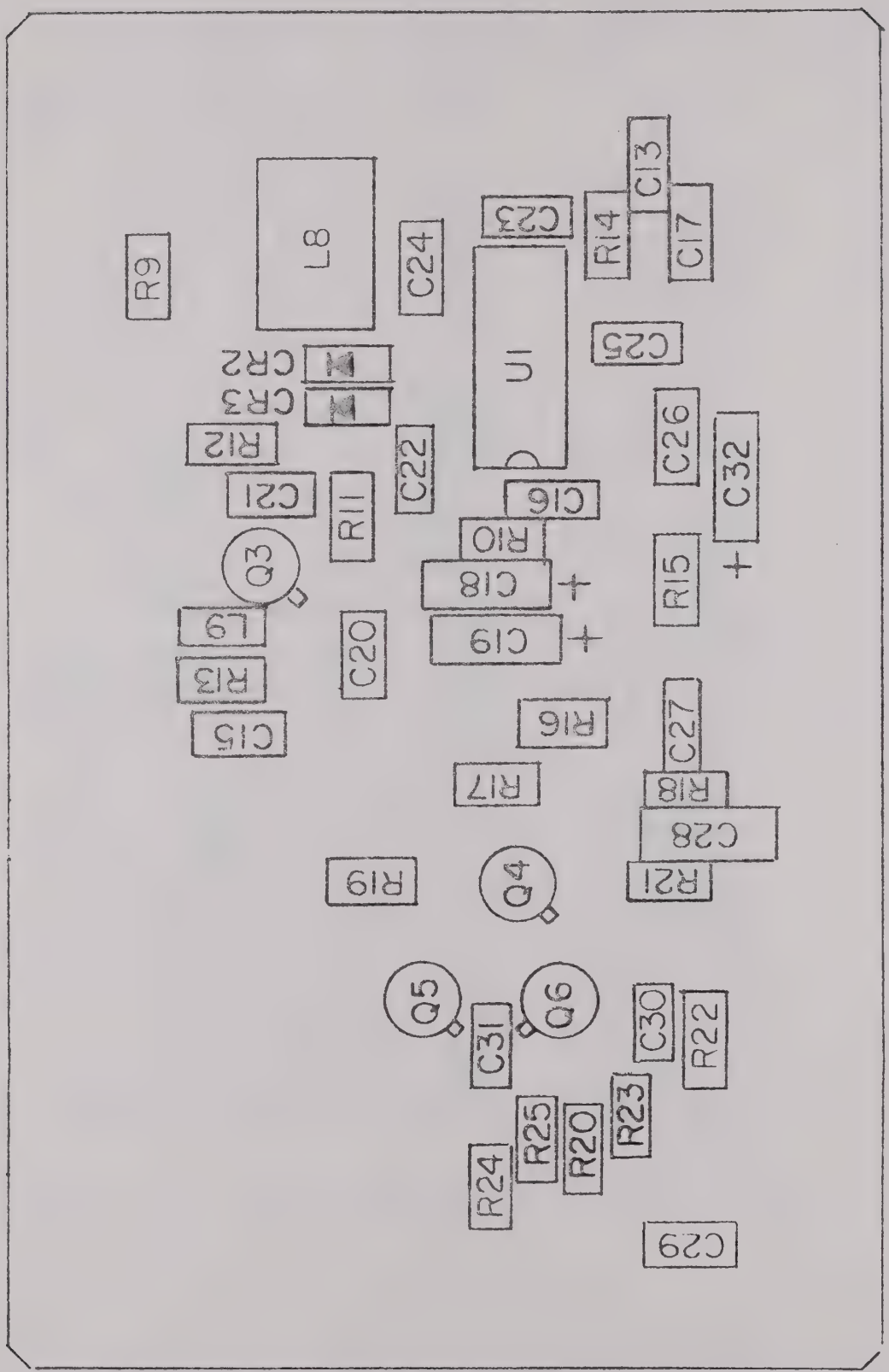


Figure 6-11. VCO Board Assembly 60A5TB5 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A5TB5	102191	12909	VCO Board Assembly (Figure 6-11)	
CR1	Not used			
CR2,CR3	402825	81349	Diode	
C1-C12	Not used			
C13	CK06BX103M	81349	Capacitor, Fixed	
C14	Not used			
C15-C17	CK06BX103M	81349	Capacitor, Fixed	
C18,C19	M39003/01-2255	81349	Capacitor, Fixed	
C20-C27	CK06BX103M	81349	Capacitor, Fixed	
C28	CM05ED330J03	81349	Capacitor, Fixed	
C29-C31	CK06BX103M	81349	Capacitor, Fixed	
C32	M39003/01-2284	81349	Capacitor, Fixed	
L1-L7	Not used			
L8	402826	12909	Inductor, Variable	
L9	402802-4	12909	Inductor, Fixed	
Q1,Q2	Not used			
Q3	2N3251A	81349	Transistor	
Q4,Q5	2N2857	81349	Transistor	
Q6	2N2222A	81349	Transistor	
R1-R8	Not used			
R9	RCR07G102KS	81349	Resistor, Fixed	
R10	RCR07G333KS	81349	Resistor, Fixed	
R11,R12	RCR07G103KS	81349	Resistor, Fixed	
R13	RCR07G472KS	81349	Resistor, Fixed	
R14	RCR07G271KS	81349	Resistor, Fixed	
R15,R16	RCR07G471KS	81349	Resistor, Fixed	
R17	RCR07G182KS	81349	Resistor, Fixed	
R18-R20	RCR07G102KS	81349	Resistor, Fixed	
R21	RCR07G181KS	81349	Resistor, Fixed	
R22	RCR07G681KS	81349	Resistor, Fixed	
R23	RCR07G741KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UCC
60A5TB5 (Continued)				
R24	RCR07G330KS	81349	Resistor, Fixed	
R25	RCR07G221KS	81349	Resistor, Fixed	
U1	402375-5	12909	Integrated Circuit	

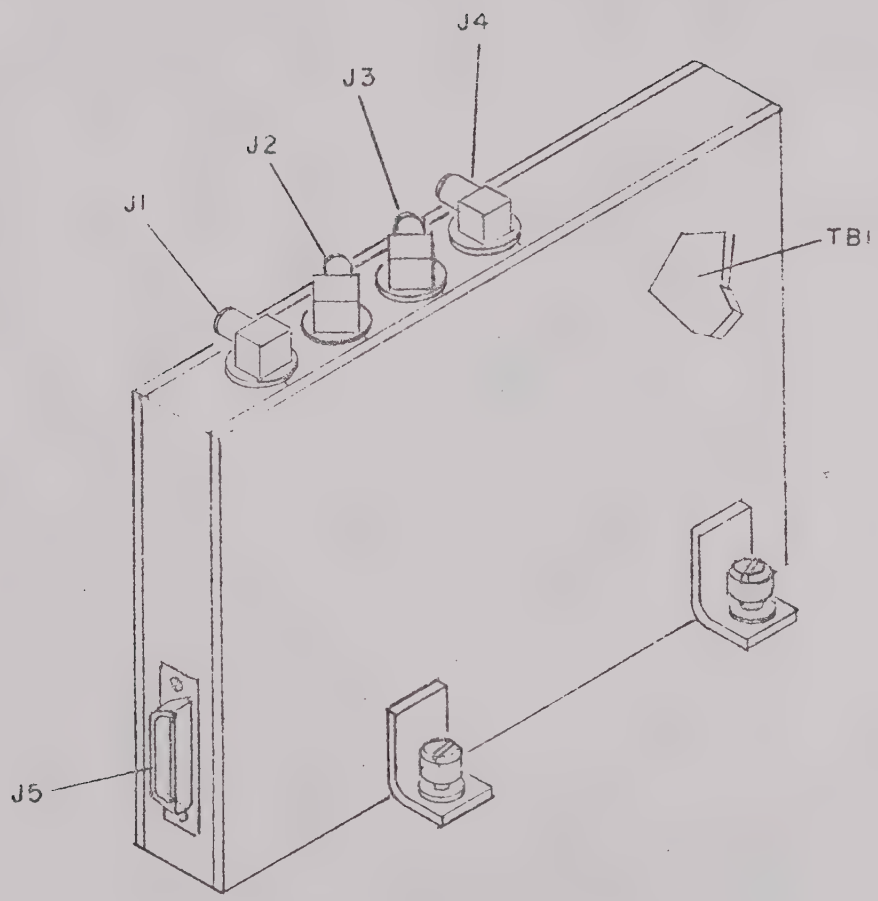


Figure 6-12. Counter-Prescaler Module 60A6 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A6	102196	12909	Counter-Prescaler Module (Figure 6-12)	
J1-J4	402930	12909	Jack	
J5	M24308/4-2	81349	Connector, Electrical	
TB1	102197	12909	Counter Prescaler (See Figure 6-13)	

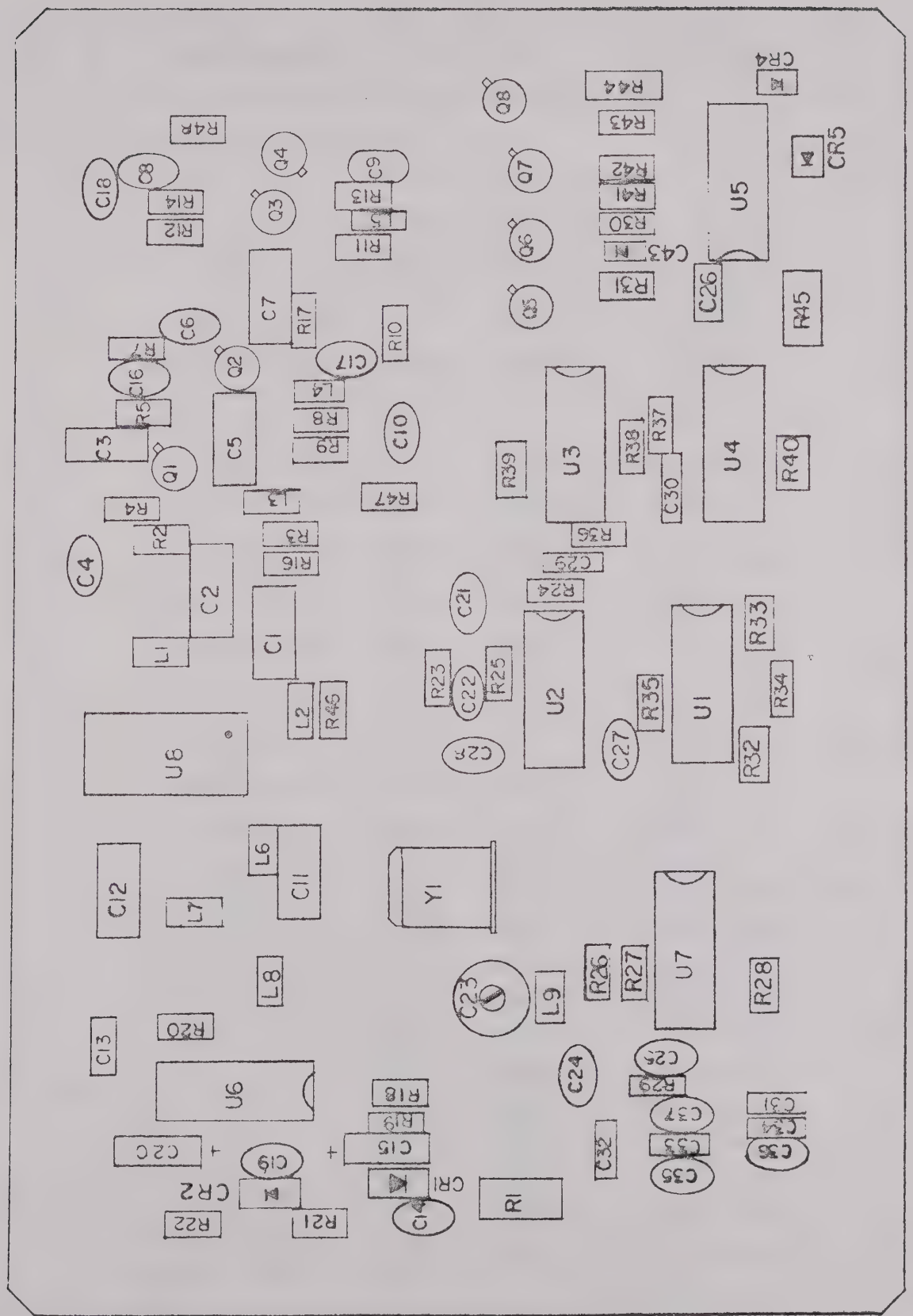


Figure 6-13. Counter-Prescaler Board 60A6TB1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A6TB1	102197	12909	Counter-Prescaler Board (Fig.6-13)	
CR1,CR2	1N753A	81349	Diode	
CR3-CR5	1N4148	81349	Diode	
C1	CM05CD180J03	81349	Capacitor, Fixed	
C2	CM05FD101J03	81349	Capacitor, Fixed	
C3	CM05CD180J03	81349	Capacitor, Fixed	
C4	CK60AW102M	81349	Capacitor, Fixed	
C5	CM05CD120J03	81349	Capacitor, Fixed	
C6	CK60AW102M	81349	Capacitor, Fixed	
C7	CM05FD101J03	81349	Capacitor, Fixed	
C8-C10	CK60AW102M	81349	Capacitor, Fixed	
C11,C12	CM05FD221J03	81349	Capacitor, Fixed	
C13	CK06BX104M	81349	Capacitor, Fixed	
C14	CK60AW102M	81349	Capacitor, Fixed	
C15	M39003/01-2255	81349	Capacitor, Fixed	
C16-C19	CK60AW102M	81349	Capacitor, Fixed	
C20	M39003/01-2255	81349	Capacitor, Fixed	
C21,C22	CK60AW102M	81349	Capacitor, Fixed	
C23	CV31D350	81349	Capacitor, Variable	
C24,C25	CK60AW102M	81349	Capacitor, Fixed	
C26	CK06BX104M	81349	Capacitor, Fixed	
C27,C28	CK60AW102M	81349	Capacitor, Fixed	
C29,C30	CK06BX104M	81349	Capacitor, Fixed	
C31-C34	CK06BX103M	81349	Capacitor, Fixed	
C35-C37	CK60AW102M	81349	Capacitor, Fixed	
L1,L2	402802-1	12909	Inductor	
L3	402802-2	12909	Inductor	
L4	MS75083-09	96906	Inductor	
L5	402802-3	12909	Inductor	
L6	MS75083-09	96906	Coil, Molded Fixed	
L7	MS75083-12	96906	Coil, Molded Fixed	
L8,L9	MS75083-09	96906	Coil, Molded Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A6TB1 (Continued)				
Q1-Q4	2N918	81349	Transistor	
Q5-Q7	2N2369A	81349	Transistor	
Q8	2N2222A	81349	Transistor	
R1	RJ24CW102	81349	Resistor, Variable	
R2,R3	RCR07G103KS	81349	Resistor, Fixed	
R4	RCR07G101KS	81349	Resistor, Fixed	
R5	RCR07G102KS	81349	Resistor, Fixed	
R6	Not used			
R7,R8	RCR07G103KS	81349	Resistor, Fixed	
R9	RCR07G102KS	81349	Resistor, Fixed	
R10	RCR07G560KS	81349	Resistor, Fixed	
R11,R12	RCR07G682KS	81349	Resistor, Fixed	
R13	RCR07G470KS	81349	Resistor, Fixed	
R14	RCR07G471KS	81349	Resistor, Fixed	
R15	Not used			
R16,R17	RCR07G220KS	81349	Resistor, Fixed	
R18,R19	RCR07G470KS	81349	Resistor, Fixed	
R20	RCR07G151KS	81349	Resistor, Fixed	
R21,R22	RCR07G221KS	81349	Resistor, Fixed	
R23	RCR07G471KS	81349	Resistor, Fixed	
R24	RCR07G820KS	81349	Resistor; Fixed	
R25-R29	RCR07G471KS	81349	Resistor, Fixed	
R30	RCR07G122KS	81349	Resistor, Fixed	
R31	RCR07G151KS	81349	Resistor, Fixed	
R32	RCR07G151KS	81349	Resistor, Fixed	
R33	RCR07G820KS	81349	Resistor, Fixed	
R34,R35	RCR07G471KS	81349	Resistor, Fixed	
R36	RCR07G151KS	81349	Resistor, Fixed	
R37	RCR07G820KS	81349	Resistor, Fixed	
R38-R40	RCR07G471KS	81349	Resistor, Fixed	
R41	RCR07G561KS	81349	Resistor, Fixed	
R42	RCR07G101KS	81349	Resistor, Fixed	
R43	RCR07G222KS	81349	Resistor. Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A6TB1 (Continued)				
R44	RN60C3480F	81349	Resistor, Fixed	
R45	RN60C1961F	81349	Resistor, Fixed	
R46,R47	RCR07G270KS	81349	Resistor, Fixed	
R48	RCR07G122KS	81349	Resistor, Fixed	
U1	402375-6	12909	Integrated Circuit	
U2	402375-7	12909	Integrated Circuit	
U3	402375-8	12909	Integrated Circuit	
U4	402375-4	12909	Integrated Circuit	
U5	402275-27	12909	Integrated Circuit	
U6	402275-34	12909	Integrated Circuit	
U7	402375-9	12909	Integrated Circuit	
U8	402830	12909	Mixer, Double Balanced	
Y1	CR76A/U60,000	81341	Crystal Unit, Quartz	

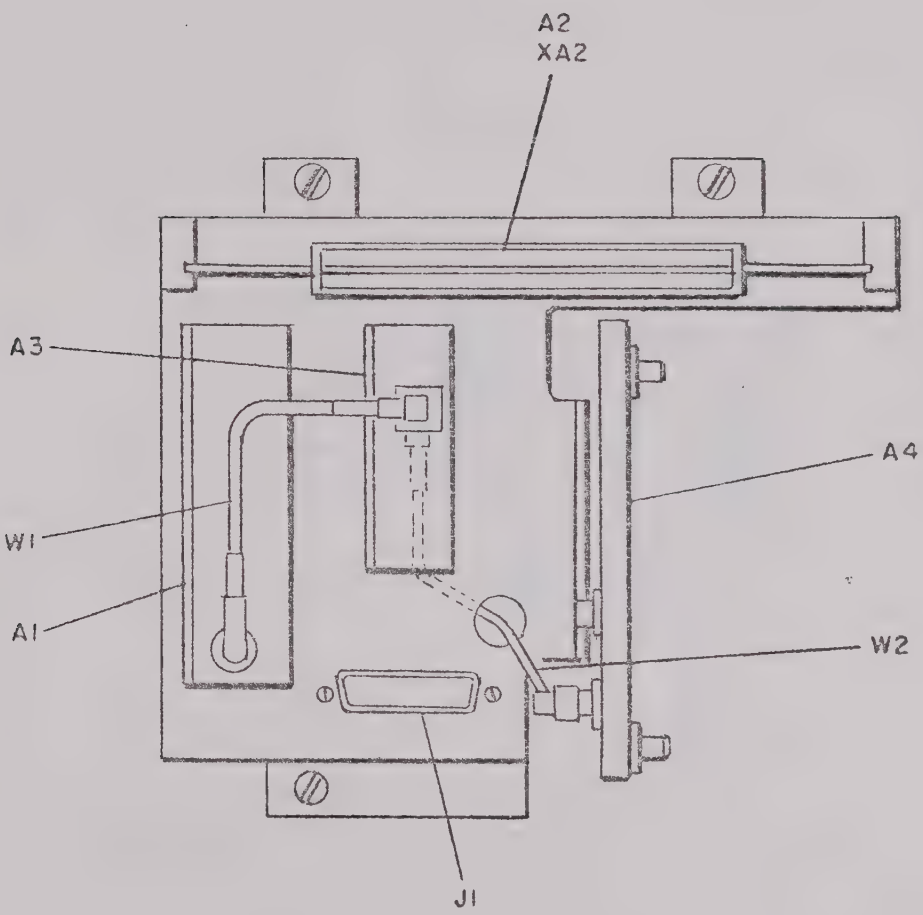


Figure 6-14. Signal Generator 60A7 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7	102198	12909	Signal Generator (Figure 6-14)	
A1	102200	12909	Signal Generator Oscillator (See Figure 6-15)	
A2	102199	12909	Signal Generator Control Board Assembly(Sec Figure 6-17)	
A3	102202	12909	Variable Gain Amplifier Assembly (See Figure 6-18)	
A4	102227	12909	Filter Detector Assembly (See Figure 6-20)	
J1	M24308/4-3	81349	Connector, Electrical	
P1	402949	12909	Connector, SMA	
W1	102751	12909	Cable Assy.	
W1P1,P2	403312	12909	Connector, SMA	
W2	102752	12909	Cable Assy.	
W2P1,P2	403312	12909	Connector, SMA	
XA2	M21097/1-99	81349	Connector, Edge	

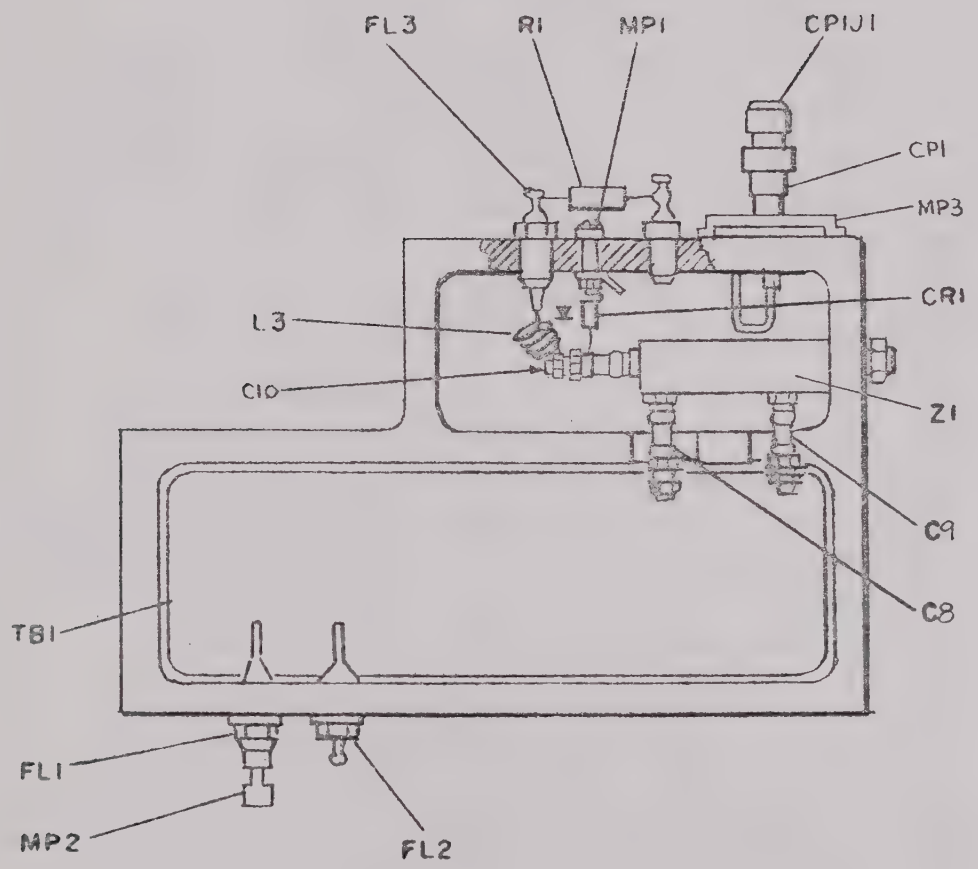


Figure 6-15. Signal Generator Oscillator 60A7A1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A1	102200	12909	Signal Generator Oscillator (Figure 6-15)	
CP1	402964	12909	Probe Assembly	
CP1J1	402945	12909	Connector, SMA	
CR1	402940	12909	Diode	
C1-C7	Not Used			
C8-C10	402938	12909	Capacitor, Variable	
FL1	402936	12909	Capacitor, Feed Thru	
FL2	402935	12909	Capacitor, Feed Thru	
FL3	402936	12909	Capacitor, Feed Thru	
L1,L2	Not Used			
L3	402972	12909	Coil, Air Wound	
MP1	590015-3	12909	Terminal, Lug	
MP2	10017-3	12909	Terminal, Ground	
MP3	504542	12909	Collar, Retaining	
R1	RCR07G103KS	81349	Resistor, Fixed	
TB1	102201	12909	Board, Signal Generator Oscillator (Figure 6-16)	
Z1	504030	12909	Post, Inductive	

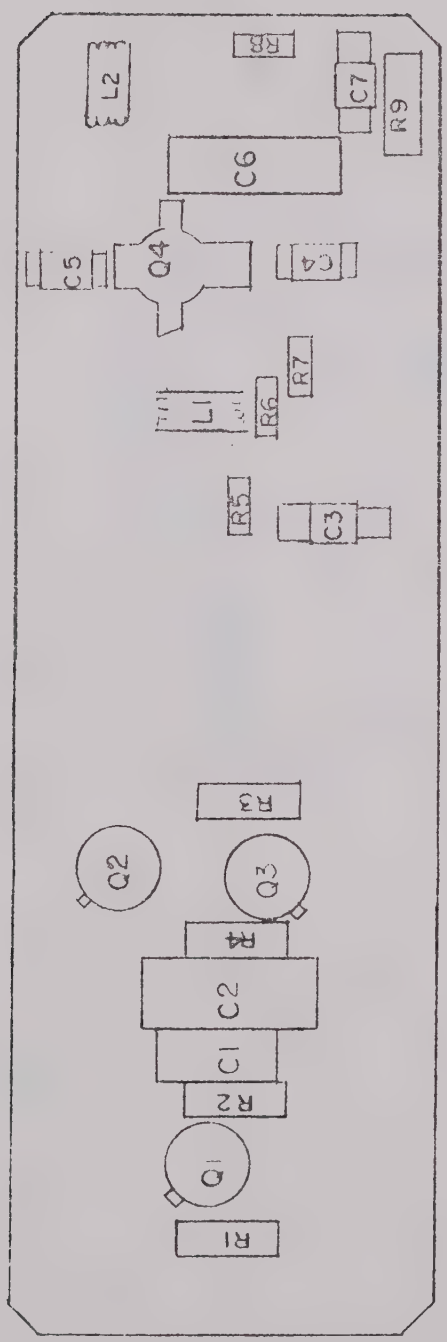


Figure 6-16. Signal Generator Oscillator Component Board Assembly 60A7A1TB1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A1TB1	102201	12909	Signal Generator Oscillator Component Board Assembly (Figure 6-16)	
C1	M39003/01-2284	81349	Capacitor, Fixed	
C2	CM05ED220J03	81349	Capacitor, Fixed	
C3,C4	402832-4	12909	Capacitor, Micro Strip	
C5	402832-3	12909	Capacitor, Micro Strip	
C6	402934	12909	Capacitor, Variable	
C7	402832-2	12909	Capacitor, Micro Strip	
L1,L2	402972	12909	Coil, Air Wound	
Q1,Q2	2N708	81349	Transistor	
Q3	2N2222A	81349	Transistor	
Q4	402939	12909	Transistor	
R1	RCR07G222KS	81349	Resistor, Fixed	
R2	RCR07G332KS	81349	Resistor, Fixed	
R3,R4	RCR07G102KS	81349	Resistor, Fixed	
R5	RCR05G470KS	81349	Resistor, Fixed	
R6,R7	RCR05G511KS	81349	Resistor, Fixed	
R8	RCR05G100KS	81349	Resistor, Fixed	
R9	RCR07G511KS	81349	Resistor, Fixed	

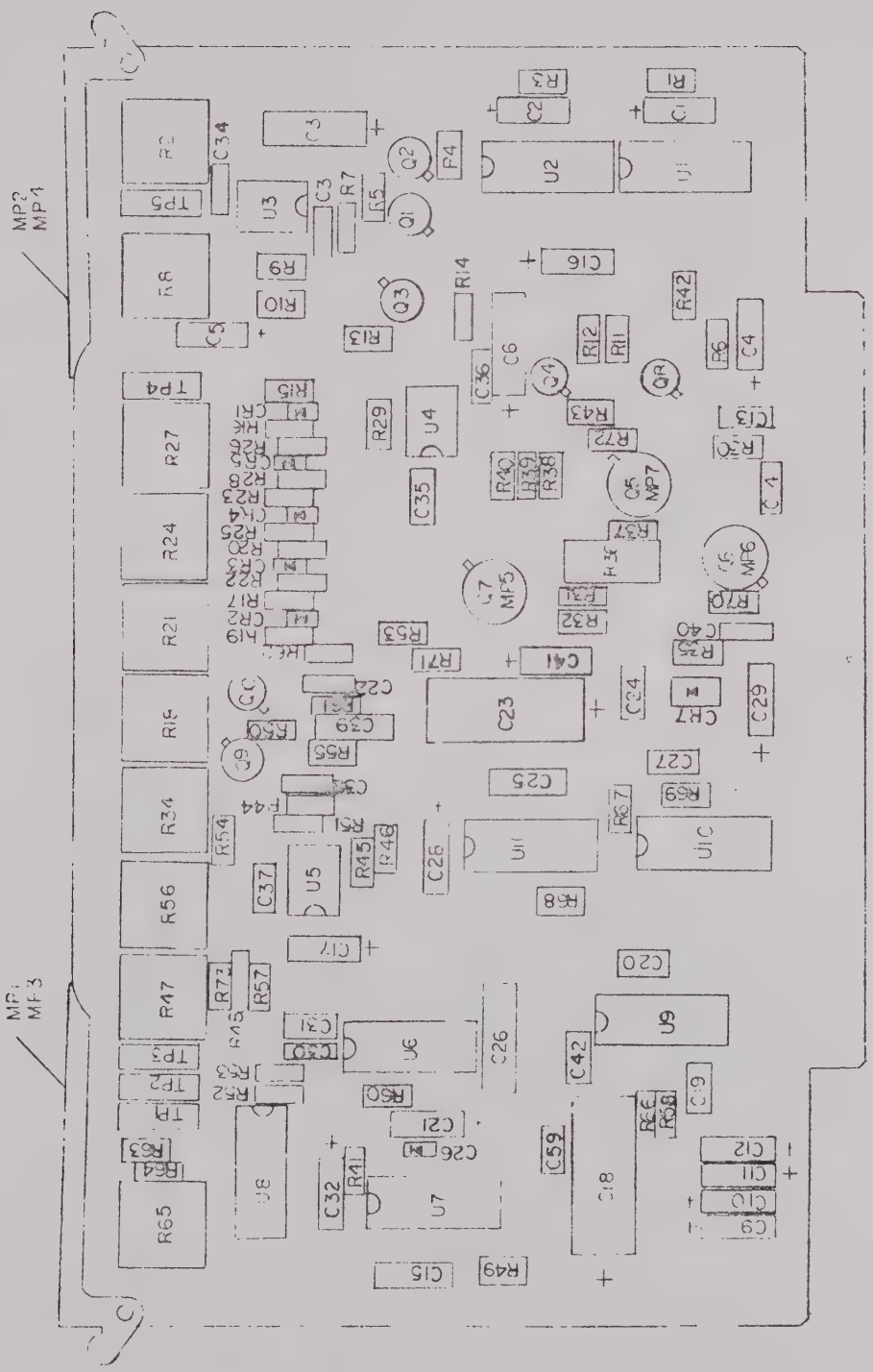


Figure 6-17. Signal Generator Control Board 60A7A2 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A2	102199	12909	Signal Generator Control Board (Figure 6-17)	
C1,C2	M39003/01-2284	81349	Capacitor, Fixed	
C3	M39003/01-2287	81349	Capacitor, Fixed	
C4,C5	M39003/01-2255	81349	Capacitor, Fixed	
C6	M39003/01-2287	81349	Capacitor, Fixed	
C7,C8	Not Used			
C9	M39003/01-2255	81349	Capacitor, Fixed	
C10,C11	M39003/01-2284	81349	Capacitor, Fixed	
C12	M39003/01-2255	81349	Capacitor, Fixed	
C13,C14	CK06BX103M	81349	Capacitor, Fixed	
C15	CM05ED820J03	81349	Capacitor, Fixed	
C16	M39003/01-2345	81349	Capacitor, Fixed	
C17	M39003/01-2284	81349	Capacitor, Fixed	
C18	M39003/01-2266	81349	Capacitor, Fixed	
C19,C20	CK06BX103M	81349	Capacitor, Fixed	
C21	M3900/01-2284	81349	Capacitor, Fixed	
C22	CK06BX103M	81349	Capacitor, Fixed	
C23	M39003/01-2251	81349	Capacitor, Fixed	
C24	CK06BX152M	81349	Capacitor, Fixed	
C25	CM05ED820J03	81349	Capacitor, Fixed	
C26	CM06FD471J03	81349	Capacitor, Fixed	
C27	CK06BX473M	81349	Capacitor, Fixed	
C28,C29	M3900/01-2284	81349	Capacitor, Fixed	
C30,C31	CK06BX103M	81349	Capacitor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A2 (Continued)				
C32	M3900/01-2284	81349	Capacitor, Fixed	
C33-C38	CK06BX103M	81349	Capacitor, Fixed	
C39	CM056D150J03	81349	Capacitor, Fixed	
C40	CK06BX103M	81349	Capacitor, Fixed	
C41	M39003/01-2255	81349	Capacitor, Fixed	
C42	CK06BX104M	81349	Capacitor, Fixed	
CR1-CR6	1N4148	81349	Diode	
CR7	1N752A	81349	Diode, Fixed	
MP1-2	10438-1	12909	Handle, Ejector	
MP3-4	10439-1	12909	Rivet, Special	
MP5-7	10436	12909	Pad, Transistor, MTG	
Q1	2N2907A	81349	Transistor	
Q2,Q3	2N2222A	81349	Transistor	
Q4	2N2907A	81349	Transistor	
Q5	2N2219A	81349	Transistor	
Q6	2N2905A	81349	Transistor	
Q7	2N2219A	81349	Transistor	
Q8	2N2222A	81349	Transistor	
Q9	2N2369A	81349	Transistor	
Q10	2N2222A	81349	Transistor	
R1	RCR07G222KS	81349	Resistor, Fixed	
R2	RT22C2P103	81349	Resistor, Variable	
R3	RCR07G222KS	81349	Resistor, Fixed	
R4	RCR07G331KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A2 (Continued)				
R5,R6	RCR07G102KS	81349	Resistor, Fixed	
R7	RCR07G562KS	81349	Resistor, Fixed	
R8	RT22C2P102	81349	Resistor, Variable	
R9	RCR07G822JS	81349	Resistor, Fixed	
R10	RCR07G333KS	81349	Resistor, Fixed	
R11	RCR07G102KS	81349	Resistor, Fixed	
R12	RCR07G272JS	81349	Resistor, Fixed	
R13	RCR07G332KS	81349	Resistor, Fixed	
R14	RCR07G330KS	81349	Resistor, Fixed	
R15	RCR07G222KS	81349	Resistor, Fixed	
R16	RCR07G683KS	81349	Resistor, Fixed	
R17	RCR07G222KS	81349	Resistor, Fixed	
R18	RT22C2P502	81349	Resistor, Variable	
R19	RCR07G473KS	81349	Resistor, Fixed	
R20	RCR07G102KS	81349	Resistor, Fixed	
R21	RT22C2P502	81349	Resistor, Variable	
R22	RCR07G153KS	81349	Resistor, Fixed	
R23	RCR07G181KS	81349	Resistor, Fixed	
R24	RT22C2P502	81349	Resistor, Variable	
R25	RCR07G103KS	81349	Resistor, Fixed	
R26	RCR07G101KS	81349	Resistor, Fixed	
R27	RT22C2P502	81349	Resistor, Variable	
R28	RCR07G562KS	81349	Resistor, Fixed	
R29	RCR07G821KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A2 (Continued)				
R30	RCR07G152KS	81349	Resistor, Fixed	
R31,R32	RCR07G272KS	81349	Resistor, Fixed	
R33	RCR07G391KS	81349	Resistor, Fixed	
R34	RT22C2P102	81349	Resistor, Variable	
R35	RCR07G471JS	81349	Resistor, Fixed	
R36	RW69V152	81349	Resistor, Fixed	
R37	RCR07G223KS	81349	Resistor, Fixed	
R38	RCR07G122JS	81349	Resistor, Fixed	
R39	RCR07G102JS	81349	Resistor, Fixed	
R40	RCR07G472JS	81349	Resistor, Fixed	
R41	RCR07G331KS	81349	Resistor, Fixed	
R42	RCR07G332KS	81349	Resistor, Fixed	
R43	RCR07G102KS	81349	Resistor, Fixed	
R44	RN55C1002F	81349	Resistor, Fixed	
R45	RN55C4752F	81349	Resistor, Fixed	
R46	RN55C3651F	81349	Resistor, Fixed	
R47	RT22C2P102	81349	Resistor, Variable	
R48	RN55C3651F	81349	Resistor, Fixed	
R49	RCR07G332KS	81349	Resistor, Fixed	
R50,R51	RCR07G333KS	81349	Resistor, Fixed	
R52,R53	RCR07G222KS	81349	Resistor, Fixed	
R54	RCR07G332KS	81349	Resistor, Fixed	
R55	RCR07G682KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A2 (Continued)				
R56	RT22C2P203	81349	Resistor, Variable	
R57	RCR07G512JS	81349	Resistor, Fixed	
R58	RN55C1001F	81349	Resistor, Fixed	
R59	RCR07G272KS	81349	Resistor, Fixed	
R60	RCR07G472JS	81349	Resistor, Fixed	
R61	RCR07G333KS	81349	Resistor, Fixed	
R62	RCR07G391KS	81349	Resistor, Fixed	
R63	RN55C2740F	81349	Resistor, Fixed	
R64	RN55C4750F	81349	Resistor, Fixed	
R65	RT22C2P102	81349	Resistor, Variable	
R66	RN55C5621F	81349	Resistor, Fixed	
R67-R69	RCR07G103KS	81349	Resistor, Fixed	
R70	RCR07G333KS	81349	Resistor, Fixed	
R71	RCR07G104KS	81349	Resistor, Fixed	
R72	RCR07G123KS	81349	Resistor, Fixed	
R73	RN55C1001F	81349	Resistor, Fixed	
TP1-TP5	M39024/11-01	81349	Conn Elec, Test Point	
U1,U2	402275-19	12909	Integrated Circuit	
U3-U5	402275-33	12909	Integrated Circuit	
U6	402275-8	12909	Integrated Circuit	
U7	402275-20	12909	Integrated Circuit	
U8	401216-1	12909	Integrated Circuit	
U9	402275-40	12909	Integrated Circuit	
U10,U11	402275-20	12909	Integrated Circuit	

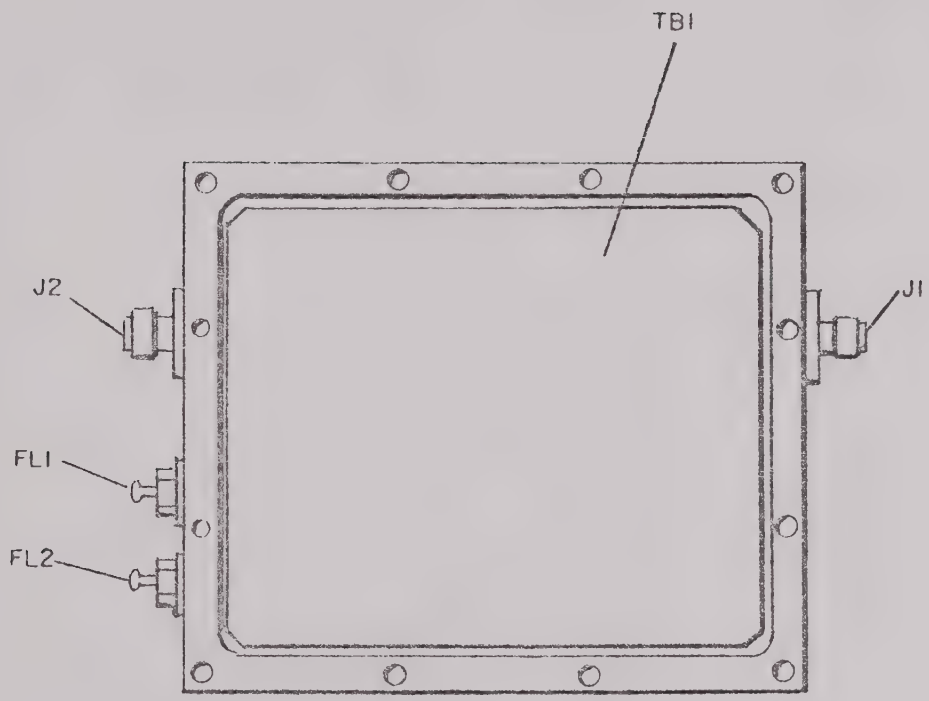


Figure 6-18. Variable Gain Amplifier 60A7A3 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A3	102202	12909	Variable Gain Amplifier (Figure 6-18)	
FL1,FL2	402935	12909	Capacitor, Feed Thru	
J1,J2	403016-1	12909	Jack, Flange Mount	
TB1	102203	12909	Variable Gain Amplifier Component Board Assembly (See Figure 6-19)	

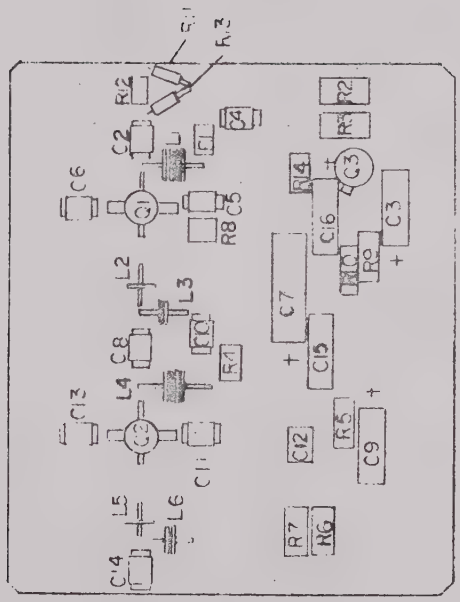
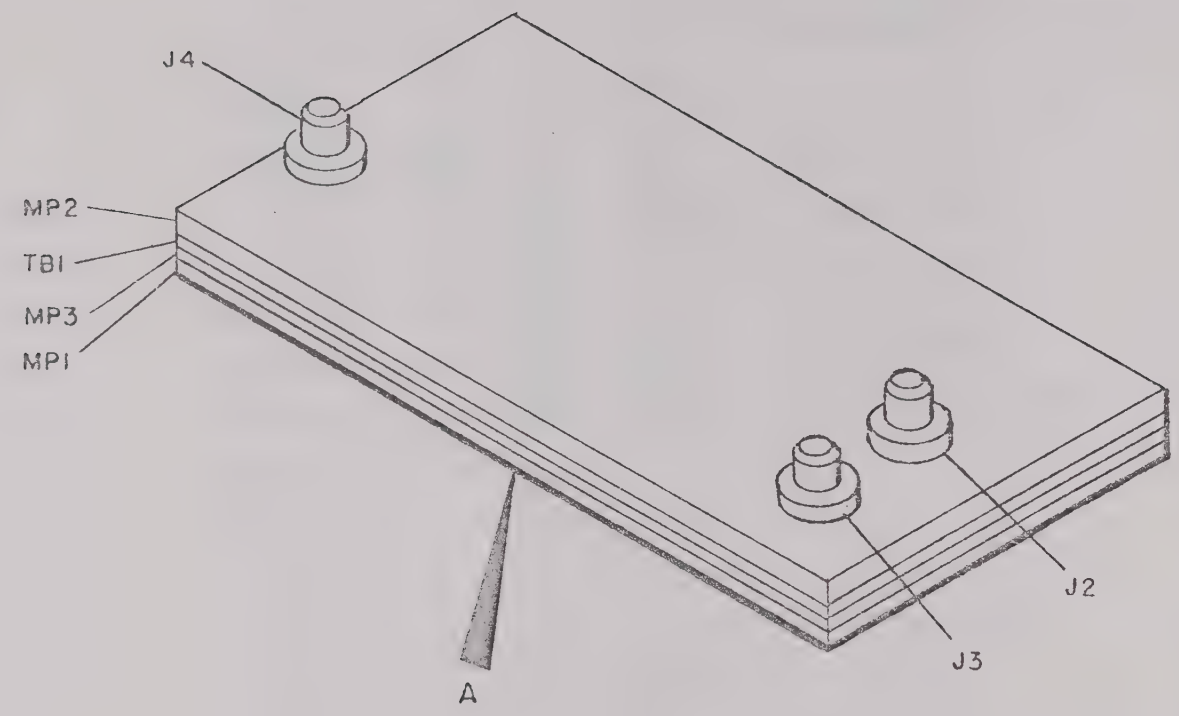
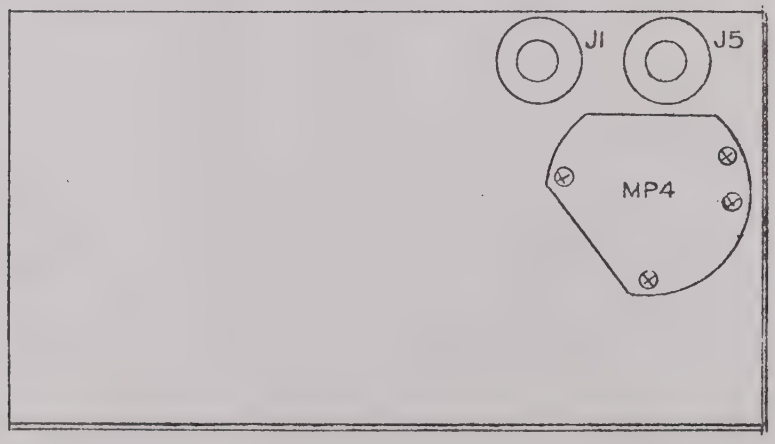


Figure 6-19. Variable Gain Amplifier Board 60A7A3TB1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A3TB1	102203	12909	Variable Gain Amplifier Board (Figure 6-19)	
C1	Not Used			
C2	402832-1	12909	Capacitor, Micro Strip	
C3	M39003/01-2255	81349	Capacitor, Fixed	
C4,	402832-4	12909	Capacitor, Micro Strip	
C5,C6	402832-3	12909	Capacitor, Micro Strip	
C7	M39003/01-2259	81349	Capacitor, Fixed	
C8	402832-1	12909	Capacitor, Micro Strip	
C9	M39003/01-2255	81349	Capacitor, Fixed	
C10	402832-4	12909	Capacitor, Micro Strip	
C11	402832-6	12909	Capacitor, Fixed	
C12	CK05BX102M	81349	Capacitor, Fixed	
C13	402832-6	12909	Capacitor, Fixed	
C14	402832-3	12909	Capacitor, Micro Strip	
C15	M39003/01-2284	81349	Capacitor, Fixed	
C16	M39003/01-2255	81349	Capacitor, Fixed	
L1	403028-3	12909	Coil	
L2	403028-1	12909	Coil	
L3	403028-2	12909	Coil	
L4	403028-3	12909	Coil	
L5	403028-1	12909	Coil	
L6	403028-2	12909	Coil	
Q1,Q2	402976	12909	Transistor, Silicon RF	
Q3	2N2222A	81349	Transistor	
R1	RCR05G101KS	81349	Resistor, Fixed	
R2,R3	RCR07G222KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A3TB1	(Continued)			
R4	RCR05G101KS	81349	Resistor, Fixed	
R5,R6	RCR07G102KS	81349	Resistor, Fixed	
R7	RCR07G181KS	81349	Resistor, Fixed	
R8	RCR05G222KS	81349	Resistor, Fixed	
R9	RCR07G471KS	81349	Resistor, Fixed	
R10	RCR07G391KS	81349	Resistor, Fixed	
R11	RCR05G391KS	81349	Resistor, Fixed	
R12	RCR05G270KS	81349	Resistor, Fixed	
R13	RCR05G391KS	81349	Resistor, Fixed	
R14,R15	RCR05G121KS	81349	Resistor, Fixed	





DETAIL A

Figure 6-20. Filter/Detector Assembly 60A7A4 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A4	102227	12909	Filter/Detector Assy (Figure 6-20)	
J1-J5	402894	12909	Connector	
MP1	504016	12909	Plate, Top Ground	
MP2	504017	12909	Plate, Bottom Ground	
MP3	402650	12909	Board, Mating	
MP4	504015	12909	Cover	
TB1	102204	12909	Filter Board Assembly (see Figure 6-21)	

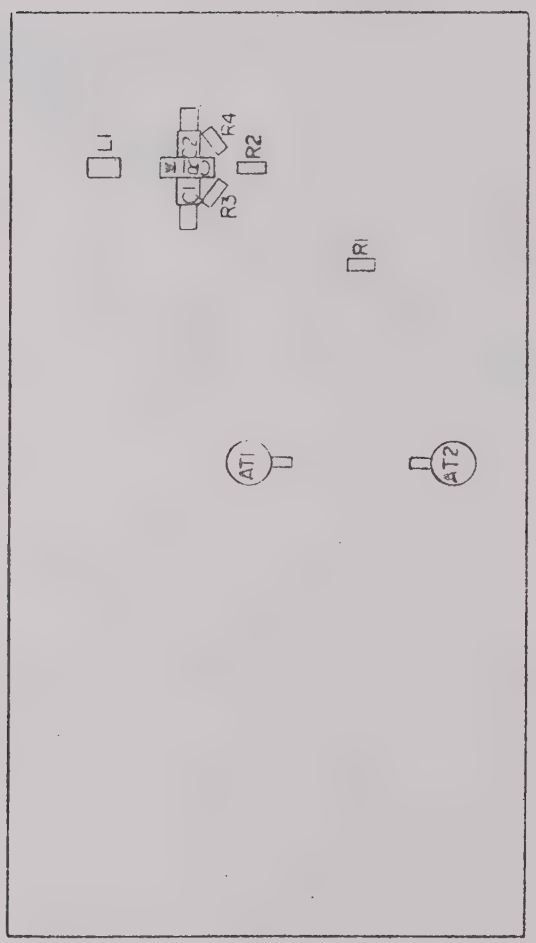


Figure 6-21. Filter-Detector Board 60A7A4TB1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A7A4TB1	102204	12909	Filter-Detector Board (Fig.6-21)	
AT1,AT2	402820	12909	Termination Assy	
C1,C2	402832-3	12909	Capacitor, Micro Strip	
CR1	1N82AG	81349	Diode	
L1	MS75083-10	81349	Inductor, Fixed	
R1	RCR05G101KS	81349	Resistor, Fixed	
R2	RCR05G100KS	81349	Resistor, Fixed	
R3,R4	RCR05G151KS	81349	Resistor, Fixed	

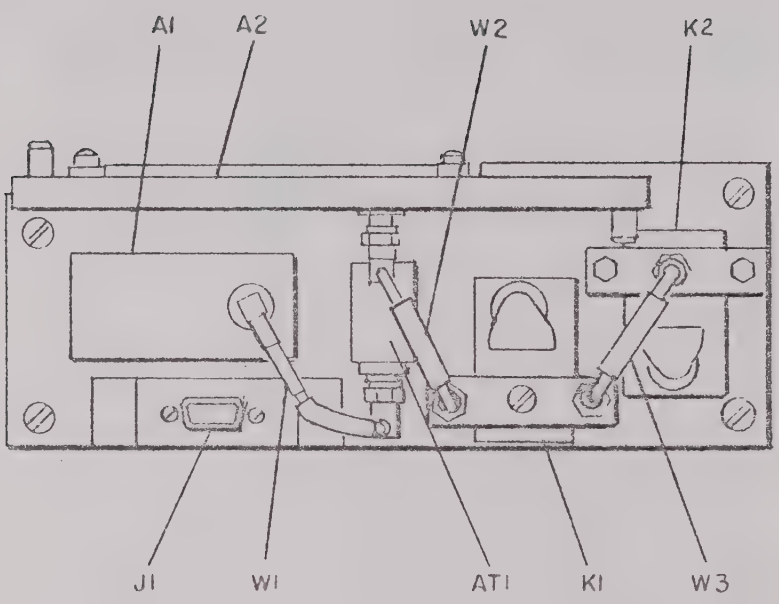


Figure 6-22. Marker Generator Assembly 60A8 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A8	102205	12909	Marker Generator Assembly (Figure 6-22)	
AT1	402907	12909	Isolator	
A1	102228	12909	Marker Generator Oscillator (See Figure 6-23)	
A2	102229	12909	Marker Generator Mixer (See Figure 6-25)	
J1	M24308/4-1	81349	Connector, Electrical	
K1,K2	402800	12909	Switch, Coaxial	
W1	102416G16	12909	Cable Assy.	
W1P1,P2	402949	12909	Connector, SMA	
W2	102416G17	12909	Cable Assy.	
W2P1,P2	402949	12909	Connector, SMA	
W3	102416G18	12909	Cable Assy.	
W3P1,P2	402948	12909	Connector, SMA	

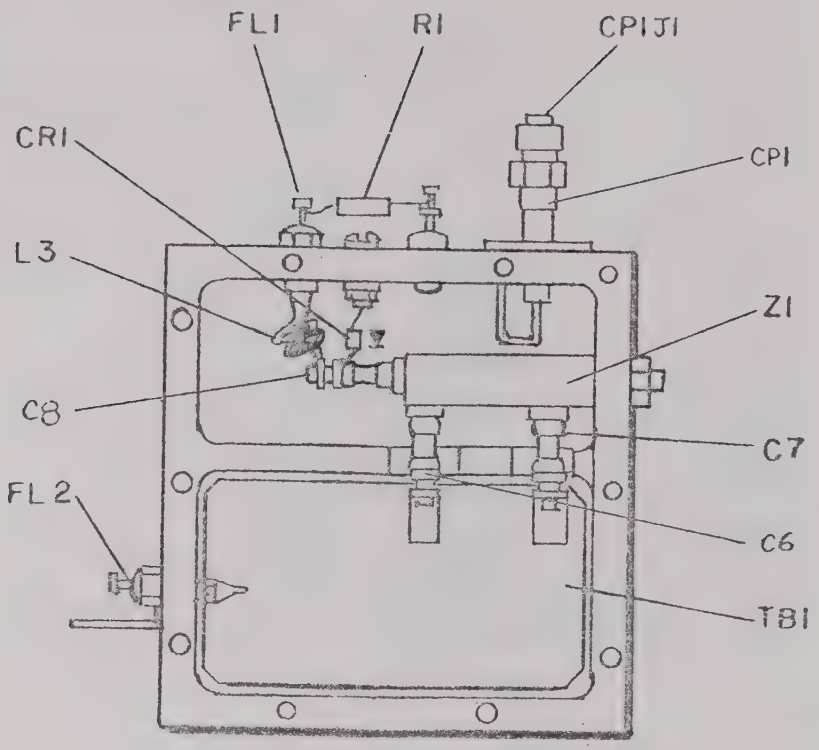


Figure 6-23. Marker Generator Oscillator 60A8A1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A8A1	102228	12909	Marker Generator Oscillator (Figure 6-23)	
C1-C5	Not Used			
C6-C8	402938	12909	Capacitor, Variable	
CP1	402964	12909	Probe Assy.	
CP1J1	402945	12909	Connector, SMA	
CR1	402940	12909	Diode	
FL1,FL2	402936	12909	Capacitor. Feed Thru	
L1,L2	Not Used			
L3	402972	12909	Coil, Air Wound	
R1	RCR07G103KS	81349	Resistor, Fixed	
TB1	102206	12909	Marker Gen Osc. Bd (See Figure 6-24)	
Z1	504030	12909	Post, Inductive	

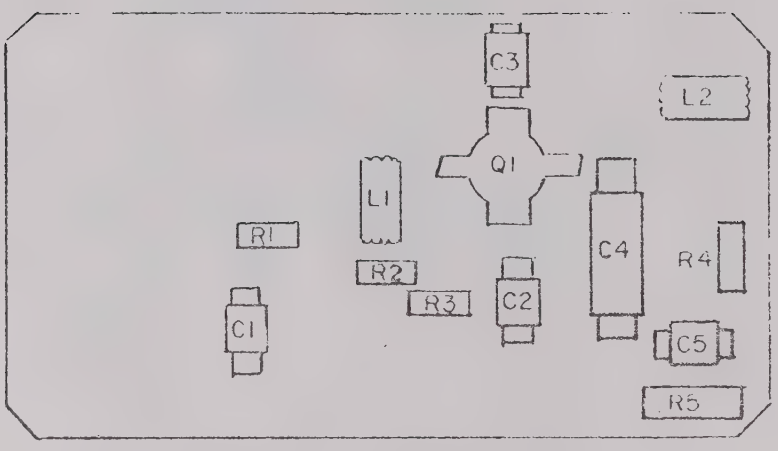


Figure 6-24. Marker Generator Oscillator Board 60A8A1TB1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A8A1TB1	102206	12909	Marker Generator Oscillator Board (Figure 6-24)	
C1,C2	402832-4	12909	Capacitor, Micro Strip	
C3	402832-3	12909	Capacitor, Micro Strip	
C4	402934	12909	Capacitor, Variable Air	
C5	402832-2	12909	Capacitor, Micro Strip	
L1,L2	402972	12909	Coil, Air Wound	
Q1	402939	12909	Transistor, Micro Wave	
R1	RCR05G470KS	12909	Resistor, Fixed	
R2,R3	RCR05G102KS	12909	Resistor, Fixed	
R4	RCR05G100KS	12909	Resistor, Fixed	
R5	RCR07G271KS	12909	Resistor, Fixed	

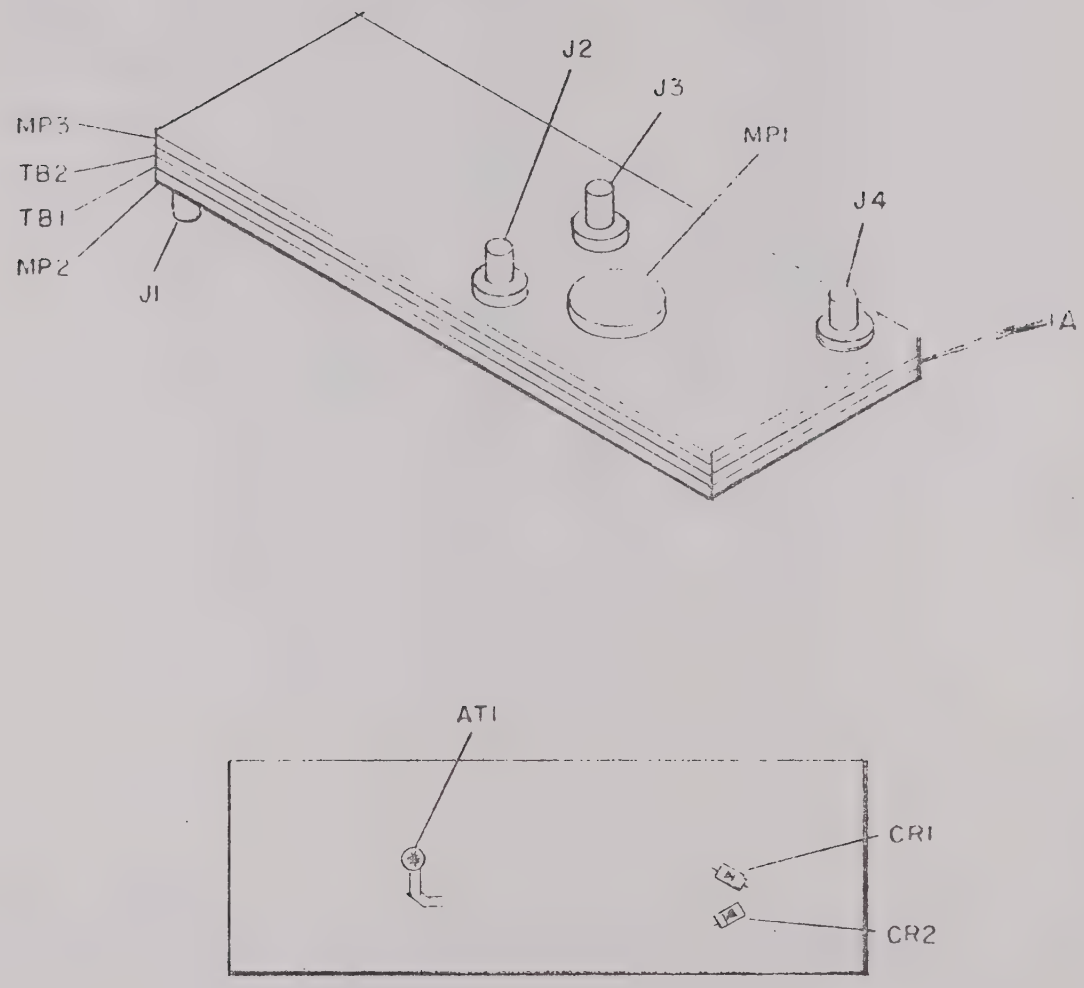
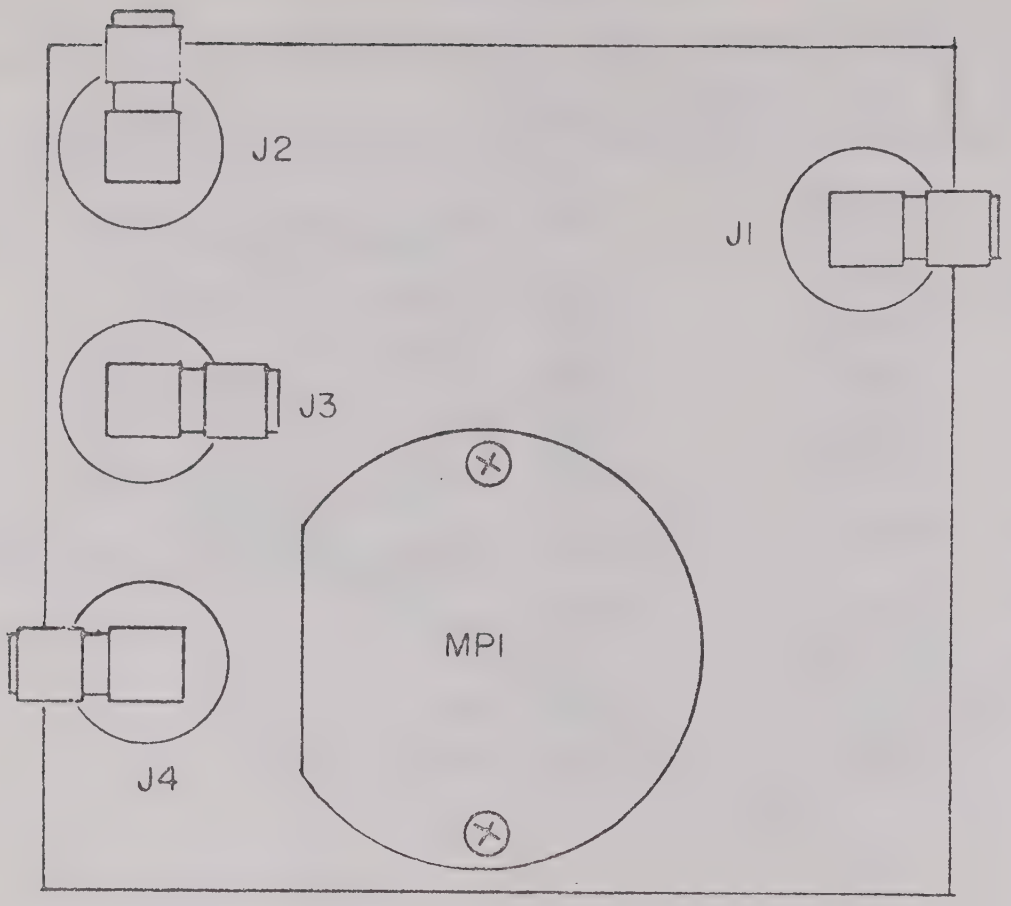


Figure 6-25. Marker Generator Mixer 60A8A2 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A8A2	102229	12909	Marker Generator Mixer (Figure 6-25)	
J1-J4	402894	12909	Connector, Stripline	
MP1	503988	12909	Cover, Disc	
MP2	503987	12909	Plate, Bottom Ground	
MP3	503986	12909	Plate, Top Ground	
TB1	102230	12909	Terminal Board, Marker Generator Mixer	
TB1AT1	402320	12909	Terminal Assembly, Resilient Stripline	
TB1CR1	402049	12909	Diode	
TB1CR2	Not used			
TB1CR3	402049	12909	Diode	
TB2	402649	12909	Board, Mating	



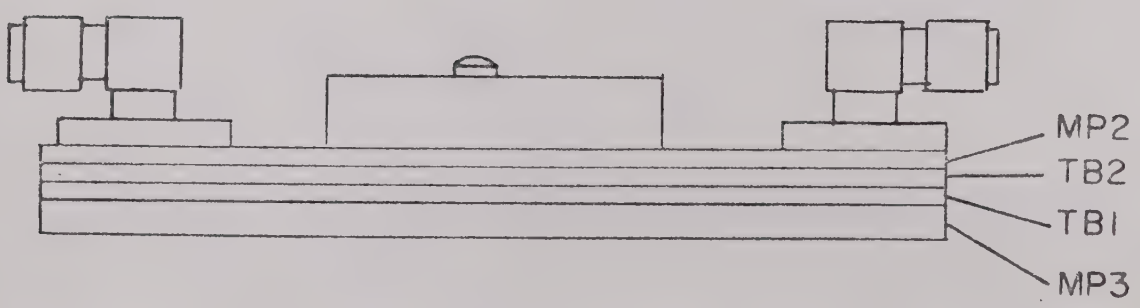


Figure 6-26. Broadband Detector Assembly 60A9 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A9	102317	12909	Broadband Detector Assy (Figure 6-26)	
J1-J4	402896	12909	Connector	
MP1	503976	12909	Plate, Cover	
MP2	503973	12909	Plate, Top	
MP3	503974	12909	Plate, Bottom	
TB1	102322	12909	Broadband Detector Board (See Figure 6-27)	
TB2	402835	12909	Board, Mating	

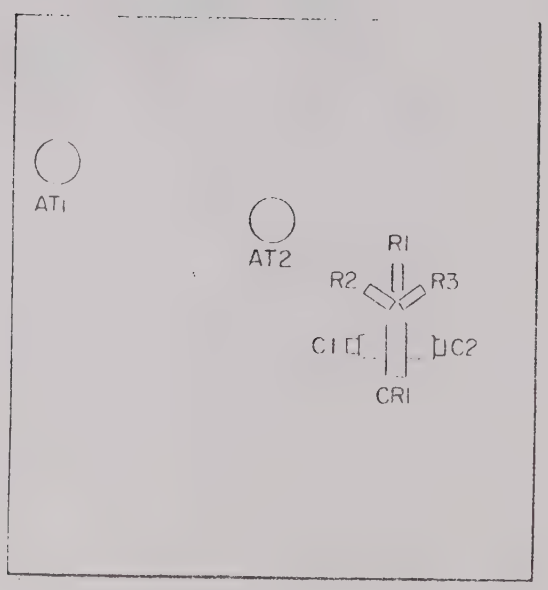


Figure 6-27. Broadband Detector Board 60A9TB1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A9TB1	102322	12909	Broadband Detector Board (Figure 6-27)	
AT1-AT2	402820	12909	Resilient Stripline Termination Assy	
C1, C2	402832-3	12909	Capacitor, Micro Strip	
CR1	1N82AG	81349	Diode	
R1	RCR05G100KS	81349	Resistor, Fixed	
R2,R3	RCR05G151KS	81349	Resistor, Fixed	
R4	RCR05G333KS	81349	Resistor, Fixed	

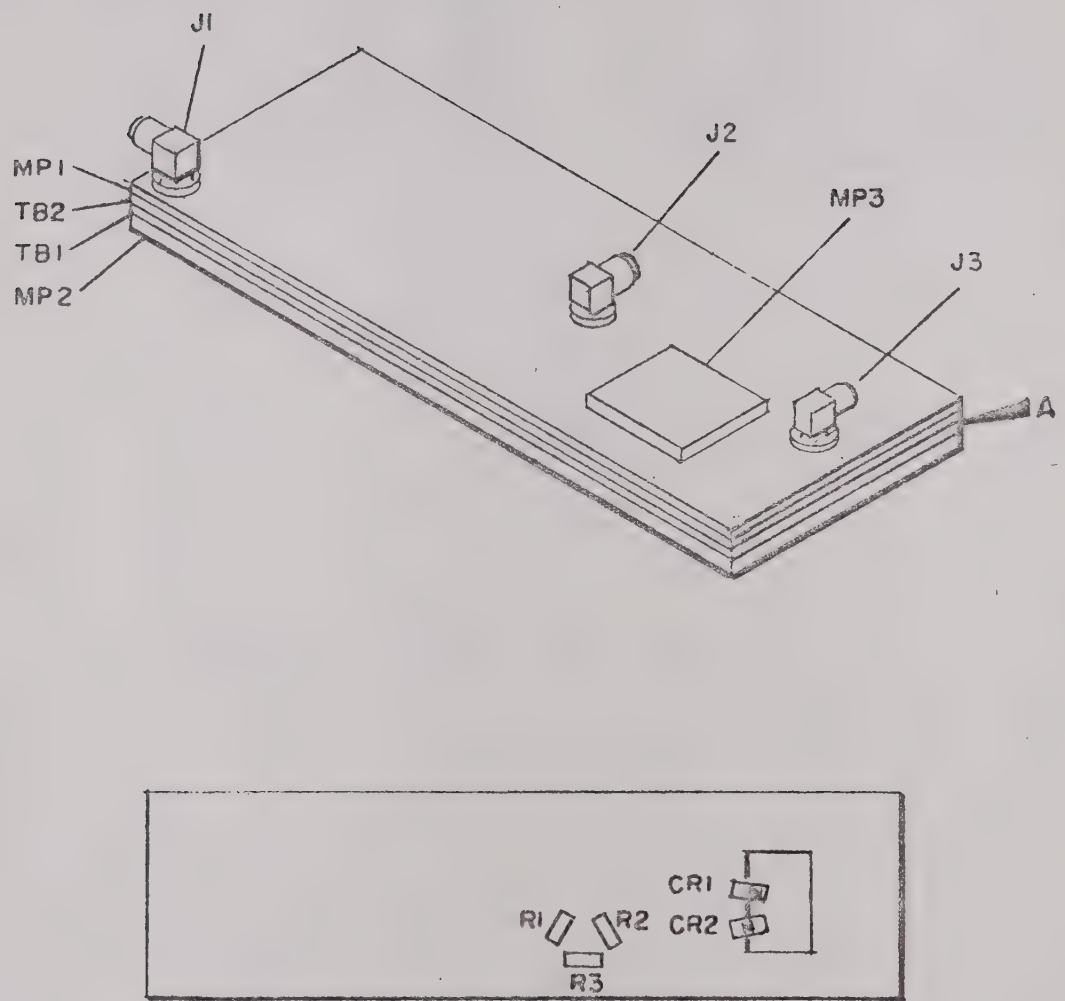


Figure 6-28. Preselector/Mixer Assembly 60A10 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A10	102318	12909	Preselector/Mixer Assembly (Figure 6-28)	
J1-J3	402896	12909	Connector, SMA	
MP1	504059	12909	Plate, Top Ground	
MP2	504060	12909	Plate, Bottom Ground	
MP3	504083	12909	Cover	
TB1	102321	12909	Preselector/Mixer Board	
TB1CR1, TB1CR2	403015	12909	Diode	
TB1R1, TB1R2	RCR05G271KS	81349	Resistor, Fixed	
TB1R3	RCR05G100KS	81349	Resistor, Fixed	
TB2	402837	12909	Board, Mating	

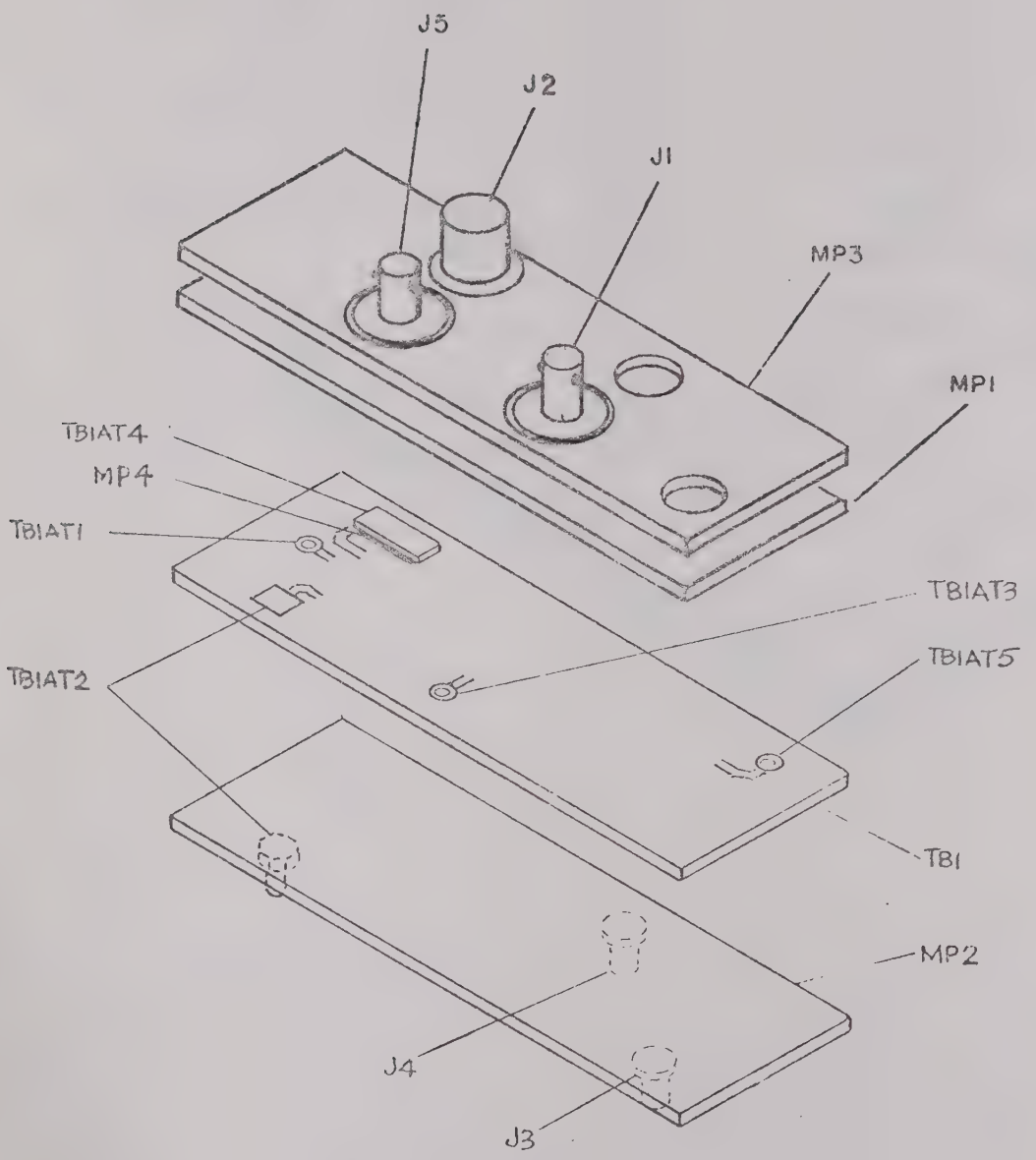


Figure 6-29. Broadband Coupler 60A11 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
60A11	102319	12909	Broadband Coupler (Figure 6-29)	
J1	402829	12909	Connector, Stripline	
J2	402895	12909	Connector, Stripline	
J3,J4	402894	12909	Connector, Stripline	
J5	402829	12909	Connector, Stripline	
MP1	402839	12909	Coupler, Directional	
MP2	503972	12909	Plate, Bottom Ground	
MP3	503971	12909	Plate, Top Ground	
MP4	403144	12909	Insulator	
TB1	102320	12909	Terminal Board, Broadband Coupler	
TB1AT1	402820	12909	Terminal Assy, Resilient	
TB1AT2	402893	12909	Resistor, Chip	
TB1AT3	402820-1	12909	Terminal Assy, Resilient	
TB1AT4	403133	12909	Termination, 50Ω , 50w	
TB1AT5	402820	12909	Terminal Assy, Resilient	

CRF-2
UNIT 60
17 DECEMBER 1973

SSR INTERROGATOR RF TEST SET

CARDION MODEL NO. CRF-2

Cardion ELECTRONICS • A UNIT OF GENERAL SIGNAL CORPORATION

LONG ISLAND EXPRESSWAY WOODBURY N.Y. 11797 U.S.A. TWX 510-221-2179 516-921-7300

CRF-2
UNIT 60
17 DECEMBER 1973

SSR INTERROGATOR RF TEST SET

CARDION MODEL NO. CRF-2

PREPARED BY:

CARDION ELECTRONICS
LONG ISLAND EXPRESSWAY WOODBURY, L. I., NEW YORK 11797

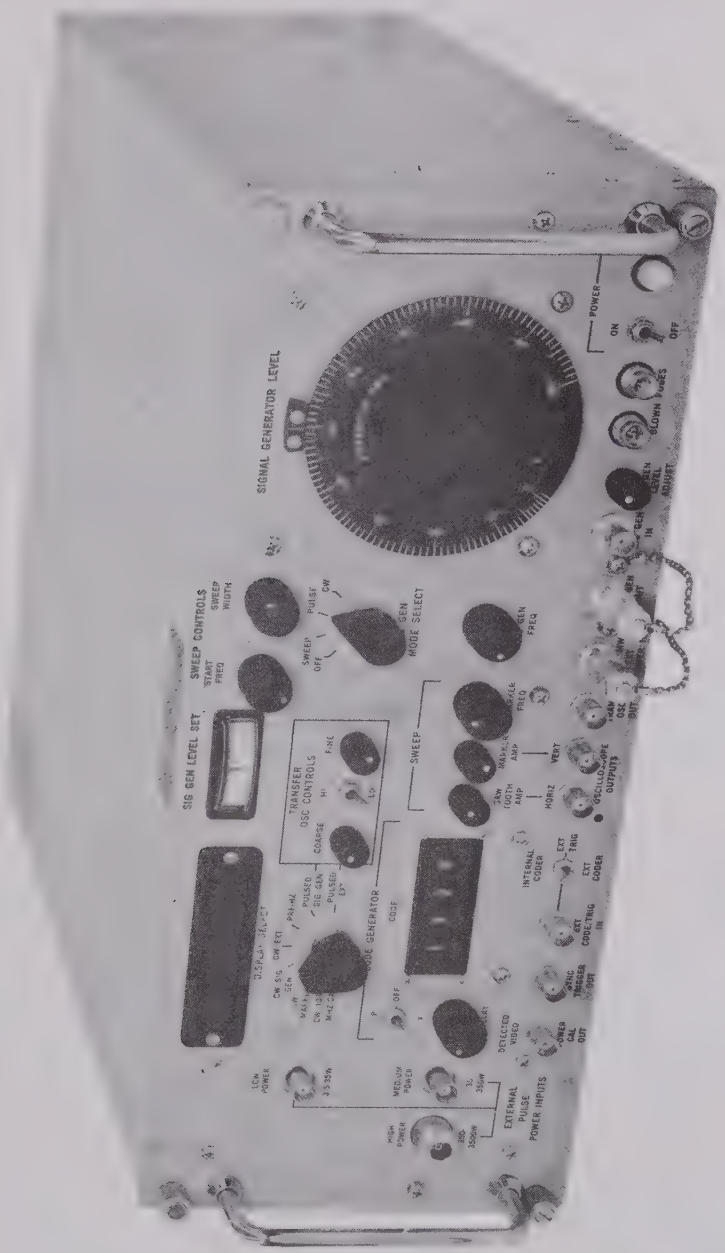


Figure 1-1. SSR Interrogator RF Test Set, Unit 60

SECTION I

GENERAL INFORMATION

1-1 INTRODUCTION

This technical manual provides the information on installation, operation, and maintenance of the SSR Interrogator, RF Test Set, hereafter referred to as the CRF. The manual is divided into six sections which include general information, installation, operation, troubleshooting with circuit diagrams, maintenance and parts list. The CRF is manufactured by Cardion Electronics, a unit of the General Signal Corporation.

1-2 GENERAL DESCRIPTION

1-2.1 The CRF is an all solid-state test set that when operating in conjunction with the SSR Decoder Video Test Set, provides simulation of either an interrogator set or a transponder for testing the RF portion of a Basic Mark 10 or Mark 10 IFF system. The CRF provides test capabilities on Modes 1, 2, 3A, B, C, D, and 4.

1-2.2 The CRF contains an RF signal Generator that generates L-band pulses that are variable in frequency (from 1010 to 1110 MHz)and amplitude (from 0 to -100 dBm). The Signal Generator can be modulated externally by an SIF code train, or can be operated in SWEEP and CW modes. A Marker Generator is employed for use in the SWEEP mode. The marker frequency can be varied from 1010 to 1110 MHz.

1-2.3 The CRF provides Frequency Measuring Circuits that utilize crystal references to measure CW or pulsed frequencies in the range of 1010 to 1110 MHz.

1-2.4 The CRF has the capability of measuring pulse powers from 3.5 watts to 3500 watts peak and up to 35 watts average. Low CW power from 1 to 20 milliwatts can also be measured.

1-2.5 Special features include a frequency "lockout" circuit that "zeroizes" the display when frequencies below 1000 MHz or above 1120 MHz are present. Additionally, internally generated RF frequencies are measured and displayed. These frequencies are the internal signal generator output, internal variable frequency marker output and crystal calibrator output. Input PRF in Hz can also be displayed. All of the above are individually selectable by means of a front panel DISPLAY SELECT switch. All the above frequencies are measured with crystal accuracy.

1-3 DESCRIPTION OF UNIT

1-3.1 The CRF may be rack or platform mounted. The chassis can be extended on slides for servicing. All operating controls and test connectors are located on the front panel. The power connector and line fuses are located on the rear panel. The blown-fuse indicators are located on the front panel.

1-3.2 The CRF consists of a Power Supply module, three plug-in printed-circuit card assemblies, LO/VCO module, Counter-Prescaler module, Signal Generator module, Marker Generator module, Broadband Detector assembly, Preselector/Mixer assembly, and a Broadband Coupler assembly.

1-3.3 The LO/VCO module contains five terminal printed-circuit boards. The Counter-Prescaler module contains one terminal printed-circuit board.

1-3.4 The Signal Generator module contains four subassemblies which include one plug-in printed-circuit card and four terminal printed-circuit cards. The Marker Generator module consists of two assemblies which include three terminal printed-circuit boards.

1-3.5 The Broadband Detector, Preselector/Mixer and Broadband Coupler are stripline devices, each of which contain two terminal printed-circuit boards (a conductor pattern board and a mating board).

1-3.6 The plug-in printed-circuit cards are provided with extractor lifts to facilitate removal. All alignment and test points are accessible without extending the cards. However, an extender card is provided for further troubleshooting.

1-4 REFERENCE DATA

1-4.1 Reference Data for the CRF is given in table 1-1.

1-5 EQUIPMENT SUPPLIED

1-5.1 The equipment supplied with the CRF is listed in table 1-2.

1-6 EQUIPMENT REQUIRED BUT NOT SUPPLIED

1-6.1 The equipment required for a complete operational installation of the CRF, but not supplied with the CRF, is listed in table 1-3.

Table 1-1. SSR Interrogator-RF Test Set Reference Data

ITEM	CHARACTERISTIC	CAPABILITIES AND LIMITATIONS
Input Power	Line Voltage	220 or 115 VAC ±10% +5 to 440 Hz;45 watts
SIG GEN IN	RF level	+20 to -100 dBm
	Pulse width	0.35 to 1.0 µs
	Risetime	less than 100 ns
	Falltime	less than 200 ns
	Coupling to high power input	16 ±2 dB
	Coupling to medium power input	37 ±2 dB
	Coupling to low power input	27 ±2 dB
1-20 MW EXT PWR IN	RF level	0 to 13 dBm (calibrated in CW mode)
	Pulse width	0.20 to 1.50 µs
	Risetime	50 to 100 ns
	Falltime	50 to 150 ns
LOW POWER IN	Power level	3.5 to 35 watts peak, 0.5 watts avg.
	Pulse width	0.20 to 1.50 µs
	Risetime	50 to 100 ns
	Falltime	50 to 150 ns
MEDIUM POWER IN	Power level	35 to 350 watts, 3.5 watts avg.
	Pulse width	0.20 to 1.50 µs
	Risetime	50 to 100 ns
	Falltime	50 to 150 ns
HIGH POWER IN	Power level	350 to 3500 watts peak, 35 watts avg.
	Pulse width	0.20 to 1.50 µs
	Risetime	50 to 100 ns
	Falltime	50 to 150 ns

Table 1-1. SSR Interrogator-RF Test Set Reference Data (Cont.)

ITEM	CHARACTERISTIC	CAPABILITIES AND LIMITATIONS
EXTERNAL CODE/ TRIG IN	Amplitude	2 to 25 volts
	Pulse width	0.35 to 1.0 μs
	Risetime	less than 100 ns
	Falltime	less than 200 ns
	PRF	100 to 10,000 Hz
	Polarity	Positive
DETECTED VIDEO POWER CAL OUT	PULSE Mode	
	Amplitude	Greater than 100 mv when terminated in 75 ohms and 3 EXTERNAL PULSE POWER INPUTS are within their specified limits
	Distortion	Less than 5% overshoot; less than 2% degradation in rise and fall times
	Calibration accuracy	±1 dB maximum (terminated in 75 ohms)
	Frequency response	1010-1110 MHz
	Polarity	Positive
	CW Mode	
	Amplitude	Greater than 100 mv when unterminated and 1-20 MW EXT PWR IN is within its specified limits
	Calibration accuracy	±1 dB maximum (unterminated)
	Frequency response	1010-1110 MHz
	Polarity	Positive

Table 1-1. SSR Interrogator-RF Test Set Reference Data (Cont.)

ITEM	CHARACTERISTIC	CAPABILITIES AND LIMITATIONS
SYNC TRIGGER OUT	Amplitude	5 ±0.5 volt
	Polarity	Positive
	Pulse width	1,50 ±0.50 µs
	Risetime	≤ 0.15 µs
	Falltime	≤ 0.20 µs
	PRF	500 ±0.1 Hz
HORIZ OSCILLOSCOPE OUTPUT	Amplitude	Ramp -4 ±1 volt to +9 ± 2 volts Baseline - 10.5 ±1 volt
	Linearity	≤ 5% from 5% to 100% point on ramp
	Adjustment range	1.8 to 1 by adjustment of SAWTOOTH AMP potentiometer
VERT OSCILLOSCOPE OUTPUT	Amplitude	From 0.1 to +2 volts peak-to-peak minimum by adjustment of MARKER AMP potentiometer
	Width	Less than 100 kHz at 90% amplitude point
TRANSFER OSC OUT	Amplitude	0.5 to 4.0 volts peak-to-peak when zero beat is achieved and EXTERNAL PULSE POWER INPUTS are within specified limits
SIG GEN OUT	CW Mode	
	Power level	From 0 to -100 dBm
	Power level accuracy	Within ±1 dB of dial reading
	Frequency response	1010-1110 MHz

Table 1-1. SSR Interrogator-RF Test Set Reference Data (Cont.)

ITEM	CHARACTERISTIC	CAPABILITIES AND LIMITATIONS
SIG GEN OUT (Cont.)	PULSE Mode	
	Power level	0 to -100 dBm
	Power level accuracy	Within ±1 dB of dial reading
	Frequency response	1010 to 1110 MHz
	Pulse width	0.45 ±.025 μs
	Risetime	less than 100 ns
	Falltime	less than 150 ns
	SWEEP Mode	
	Power level	0 to -100 dBm
	Power level accuracy	Within ±1 dB of dial reading
	Maximum sweep width	1010-1110 MHz minimum
	Amplitude flatness	±0.5 dB from 1010-1050 MHz or from 1070-1110 MHz
	Minimum sweep width	10 MHz maximum

Table 1-2. Equipment Supplied with the CRF-2

Part Number	Quantity	Description
504056G2	1	Container, Accessory
102444-1	1	Cable Coax, BNC-50 ohm
102444-2	2	Cable Coax, BNC-50 ohm
102444-3	1	Cable Coax, BNC-50 ohm calibrated
102444-4	2	Cable Coax, BNC-75 ohm
102444-5	1	Cable Coax, HN Calibrated
102444-6	3	Cable Coax, SMA Extender
102445G1	1	Cable, Power
403067	1	Adapter, BNC-SMA
403068	1	Termination, 50 ohm
UG-274B	1	Tee, 50 ohm
UG-309/U	1	Adapter, BNC-HN
MX-55 4A/U	1	Termination, 75 ohm
102535	1	Connector and capacitor assembly
504322	1	Calibration Chart - High Power/Medium Powe
504323	1	Calibration Chart - Low Power/EXT Power
---	1	Technical Manual

Table 1-3. Test Equipment Required But Not Supplied with the CRF-2

Qty.	Name	Designation	Required Use
1	Digital Voltmeter	Simpson 460 or equiv.	Check voltages and resistances
1	Oscilloscope	Tektronix 7403N or equiv.	Waveform observation
1	Pulse Generator	Cardion CPG-5 or equiv.	Check trigger inputs
1	High Power RF Source	Applied Microwave Laboratory AML PG5K or equiv.	Check power measurement circuits
1	Calorimeter	PRD N685-2 or equiv.	Check circuit alignment
1	Power Meter	PRD 6685 or equiv.	Check circuit alignment
1	Frequency Counter	Hewlett Packard 5300A/5303A or equiv.	Check circuit alignment

SECTION II
INSTALLATION

2-1 GENERAL

2-1.1 The CRF provides signals for the complete testing of the RF portion of an IFF system. The unit may be rack or platform mounted.

2-2 UNPACKING AND HANDLING

The CRF requires no special instruction for unpacking or handling.

2-3 SITE SELECTION

There are no specific site selection requirements for the CRF. However, it can be installed near the equipment that it will most frequently test. The CRF can also be used as a portable unit.

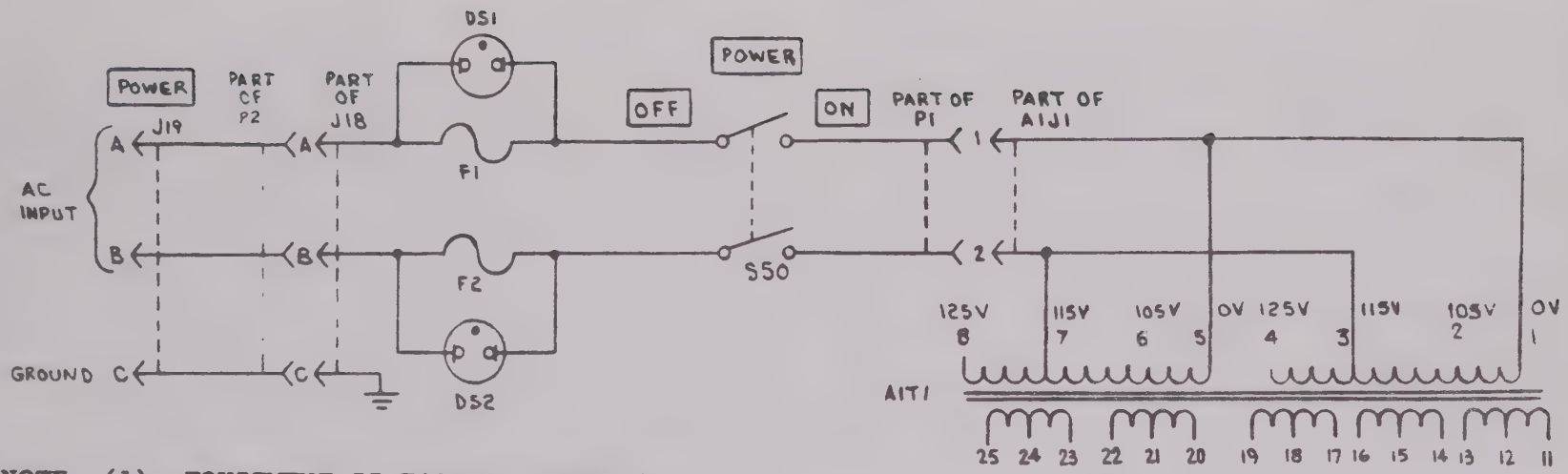
2-4 POWER REQUIREMENTS AND DISTRIBUTION

2-4.1 The CRF is designed to operate from a single power source of 115 VAC or 220 VAC at 45 to 440 Hz.

CAUTION

The CRF is factory set for 115 VAC operation. Make the required wiring change if operation is from 220 VAC. See figure 2-1.

Use only 1 ampere fuses for 115 VAC or 0.5 ampere fuses for 220 VAC. Under no circumstances replace the fuses in this equipment with a fuse of excessive rating. This could seriously damage the power transformer and the various other components in the power supply.



NOTE: (1) EQUIPMENT IS FACTORY WIRED AS SHOWN FOR 115 VAC

(2) USE 0.5 A FUSES FOR 220 VAC OR 1.0 A FUSES FOR 115 VAC.

A1T1 PRIMARY CONNECTIONS

LINE VOLTAGE	CONNECTIONS		
	A1J1-1 to	A1J1-2 to	A1T1 Terminal Connections
105 VAC	A1T1-1, A1T1-5	A1T1-2, A1T1-6	-
115* VAC	A1T1-1, A1T1-5	A1T1-3, A1T1-7	-
125 VAC	A1T1-1, A1T1-5	A1T1-4, A1T1-8	-
210 VAC	A1T1-1	A1T1-6	2 to 5
220 VAC	A1T1-1	A1T1-7	2 to 5
230 VAC	A1T1-1	A1T1-8	2 to 5

*STANDARD FACTORY WIRING

Figure 2-1. Primary Power Distribution

2-4.2 A tapped primary is provided to permit operation at line voltages different from the nominal values. The total power required is approximately 45 watts. Refer to figure 2-1 for primary power distribution information and transformer connections.

2-5 INSTALLATION LAYOUT

2-5.1 The CRF can be permanently installed near the equipment that it will most frequently test. Outline dimensions and recommended mounting methods are shown in figure 2-2.

2-5.2 The CRF should be positioned so that all controls are accessible. Provision should be made to allow access to the rear panel power cable and to allow removal of the chassis from the case for service.

2-6 TERMINATIONS

Resistive terminations are provided on the front panel jacks to terminate SIG GEN IN and 1-20 MW EXT PWR IN when not in use. Other terminations are provided in the accessory kit listed in table 1-2.

2-7 INSTALLATION REQUIREMENTS

2-7.1 The CRF can be synchronized to the IFF system by any of the following three methods:

a. The CRF can be used as the synchronizing source by setting the INTERNAL CODER/EXT TRIG/EXTERNAL CODER switch to INTERNAL CODER and using the SYNC TRIGGER OUT as the system trigger. In this manner the Signal Generator is modulated by the Internal Code which is selectable by front panel code switches.

2-7.1 b. The CRF can be modulated by an External Code source by setting the INTERNAL CODER/EXT TRIG/EXTERNAL CODER switch to EXTERNAL CODER. In this manner, the Signal Generator is modulated by the code applied to the EXTERNAL CODE/TRIG IN jack.

c. The CRF can be synchronized to a trigger supplied to the EXTERNAL CODE/TRIG IN jack. The INTERNAL CODER/EXT TRIG/EXTERNAL CODER switch should be set to EXT TRIG. In this manner the Signal Generator is modulated by the Internal Code which is selectable by front panel code switches.

2-8 TEST FEATURES

Critical signals are brought to test points on each printed circuit card. Portions of the CRF can conveniently be used to check other portions. Marker Generator and Signal Generator alignments are performed by utilizing the front panel display.

2-9 INSPECTION

After the CRF has been installed, set the POWER ON/OFF switch to OFF; pull out the front panel and chassis from the case, and inspect for any irregularities.

NOTE

Check each card to be certain that every card is correctly seated and that all module power connectors and RF connectors are secured properly.

2-10 ENERGIZING EQUIPMENT FOR FIRST TIME

Use the following procedure for energizing the CRF for the first time:

a. Ensure the POWER ON/OFF switch is set to OFF.

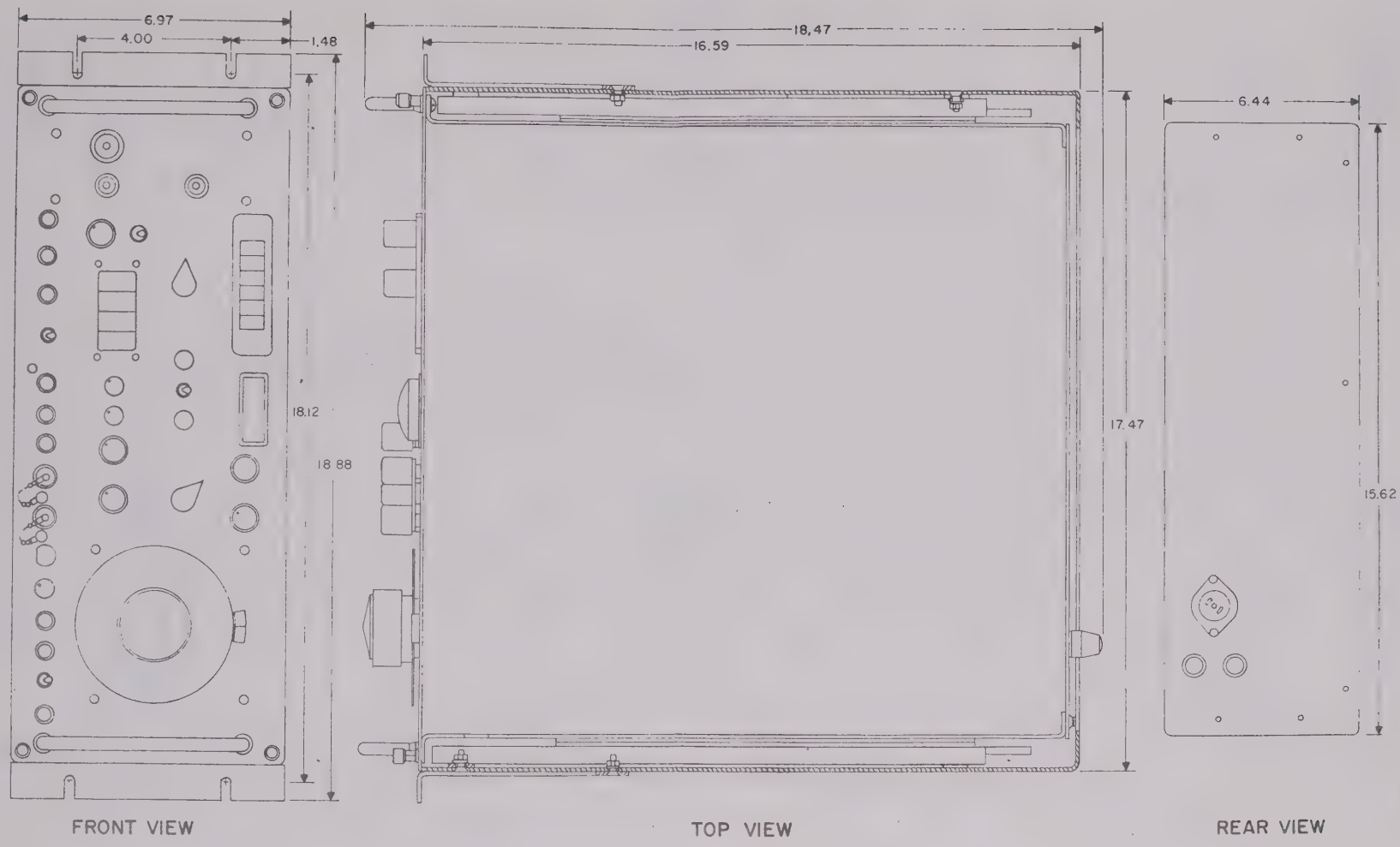


Figure 2-2. SSR Interrogator RF Test Set, Outline and Mounting Dimensions (Sheet 1 of 2)

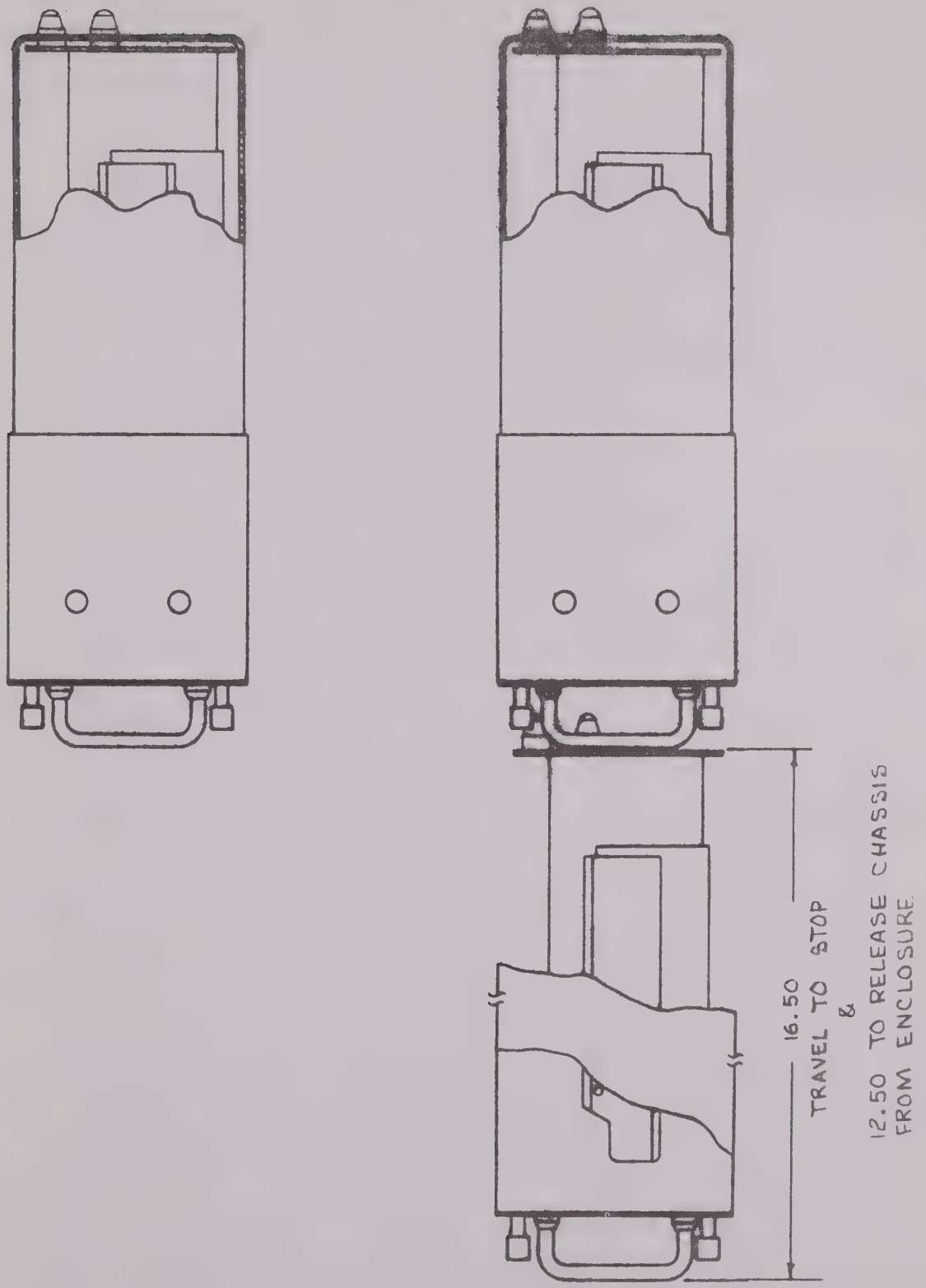


Figure 2-2. SSR Interrogator RF Test Set, Outline and Mounting Dimensions (sheet 2 of 2)

b. Measure the input a-c line voltage that will be used to power the CRF. This voltage must be within 10% of the voltage for which the CRF is wired. See figure 2-1. The taps to be used should be those which most closely match the measured voltage.

c. After the input a-c line voltage requirements have been satisfied, the CRF may be energized by setting the POWER ON-OFF switch to ON.

2-11 OPERATIONAL CHECKOUT AND INITIAL ADJUSTMENT

Before releasing the CRF for operation, perform the following operational checkout and adjustment procedure, to ensure that the equipment is operating properly. This procedure may also be used whenever there is a need to establish that the CRF is in full operational readiness. If abnormal performance is indicated during the checkout procedure, refer to the troubleshooting and maintenance routines in Sections IV and V. All test equipment required to perform these checks is listed in table 1-3.

2-12 CHECKOUT PROCEDURES

a. Set all controls according to table 2-1.

b. Energize the CRF

c. Connect the SIG GEN OUT port to the 1-20 MW EXT PWR IN port by way of the 3-inch jumper cable supplied in the Accessory Kit. Adjust the SIG GEN FREQ potentiometer for a Display reading of 1090.00 ±1 MHz.

Table 2-1. Control Settings for Checkout Procedure

Control	Setting
DISPLAY SELECT switch	CW SIG GEN
TRANSFER OSC HI/LO switch	HI
SIG GEN MODE SELECT switch	CW
CODE Switches	7700
I/P/X/OFF Switch	OFF
INTERNAL CODER/ EXT TRIG/EXTERNAL CODER	INTERNAL CODER
START FREQ pot	Fully counter clockwise
SWEEP WIDTH pot	Fully clockwise
SIGNAL GENERAL LEVEL Attenuator	0 dBm
CODE GENERATOR DELAY pot	Fully counter clockwise
SAWTOOTH AMP pot	Fully clockwise
MARKER AMP pot	Fully clockwise
MARKER FREQ pot	Set for display reading of 1090.00 ±0.1 MHz
SIG GEN FREQ pot	Mid-range
SIG GEN LEVEL ADJUST pot	Set for Red Line indication on SIG GEN LEVEL SET meter
TRANSFER OSC COARSE control pot	Mid-range
TRANSFER OSC FINE control pot	Mid-range

d. Adjust SIG GEN LEVEL ADJUST for Red Line reading on SIG GEN LEVEL SET meter. Connect POWER CAL OUT to oscilloscope and measure the CW power by utilizing the calibration chart for the 1-20 MW EXT PWR IN jack. Check that power is +1 ±1 dBm. If power level is not correct, adjust A7A2R65. Ensure that POWER CAL OUT is unterminated at scope end. Place SIG GEN MODE SELECT switch to OFF and observe that POWER CAL OUT signal disappears.

e. Set SIG GEN MODE SELECT switch to CW. Adjust SIG GEN LEVEL ADJUST to its two extremes and ensure power reading changes by at least 0.7 dB in both directions. If power does not vary by ± 0.7 dB, adjust SIG GEN LEVEL ADJUST for average value of both power level readings. Adjust A7A2R65 for +1 dBm. Adjust A7A2R47 for a Red Line reading on SIG GEN LEVEL SET meter. Adjust SIG GEN LEVEL ADJUST to its two extremes and ensure power reading change of at least 0.7 dB in both directions. Set SIG GEN LEVEL ADJUST for A Red Line reading on SIG GEN LEVEL SET meter.

f. Tune SIG GEN FREQ potentiometer from 1000 to 1120 MHz and ensure power level changes by no more than ±0.5 dB from the calibrated dBm level. Also check for proper "lockout" operation of the front panel Display. Proper operation is evidenced by a Display of 0000.00 at frequencies below 1000.00 MHz and above 1120.00 MHz. Ensure that as SIG GEN FREQ potentiometer is rotated counter clockwise from the 1000.00 MHz "lockout" point and fully clockwise from the 1120.00 MHz "lockout" point that the Display stays "zeroized". Return frequency to 1090.00± 1.00 MHz.

g. Place SIG GEN MODE SELECT switch to PULSE. Trigger scope with SYNC TRIGGER OUT of CRF. Terminate POWER CAL OUT with 75-ohm load. The signal format should conform to figure 2-3. Pulse tolerances should be disregarded at this time.

h. As SIG GEN MODE SELECT switch is rotated between PULSE and CW, note that the waveform amplitude differs by no more than 10%. In PULSE Mode, ensure that pulse width is 0.45±.025 µs, and that risetime and falltime are each less than 100 ns. If the pulse width differs by more than ±0.025 µs, set correct pulse width by adjusting A3R3.

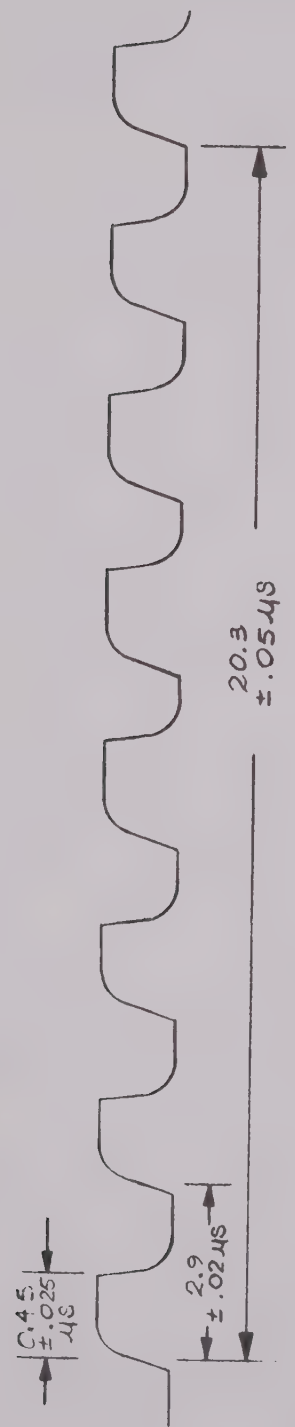


Figure 2-3. Signal Generator Output in PULSE mode

i. Measure delay between SYNC TRIGGER OUT and first pulse of code train as viewed on scope at POWER CAL OUT jack. Ensure that delay is less than 15 µs. Also measure jitter of the first code train pulse. Ensure jitter is less than 1% of delay.

j. Set CODE GENERATOR DELAY potentiometer fully clockwise. Measure delay and jitter as in step i. Ensure that delay is greater than 500 µs and jitter is less than 1% of delay.

k. Place the INTERNAL CODER/EXT TRIG/EXTERNAL CODER switch to EXT TRIG position and connect the ZERO TRIGGER of the CPG-6 to the sync input of the scope and the EXTERNAL CODE/TRIG IN jack by means of a "tee" connector. Ensure that the code observed at the POWER CAL OUT jack is "synced" to the ZERO TRIGGER of the CPG-6 and is controlled by the CODE GENERATOR DELAY control. Connect the calibrated 1.45 µSEC MARKERS of the CPG-6 to channel B of the scope. Using the delay feature of the scope in the external trigger mode, measure the distance between the first and last pulses by setting the time base to 0.1 µs per divisions and aligning the code pulses (using the CODE GENERATOR DELAY) with the 1.45 µSEC MARKERS. Adjust A3R2 for a 20.3 ± 0.5 µs spacing as shown in figure 2-3. Check that the 8 pulses are spaced 2.9 ±.02 µs When complete, disconnect the 1.45 µSEC MARKERS from the scope.

l. Place the CODE switches to 7777. Observe a complete 7777 SIF Code Train. Set I/P/OFF/X switch to X position. Observe addition of X pulse. Set same switch to I/P position and note addition of I/P pulse.

m. Place DISPLAY SELECT switch to PULSED SIG GEN position. Disconnect cable from POWER CAL OUT and connect to TRANSFER OSC OUT.

n. Adjust TRANSFER OSC COARSE and FINE potentiometers until a "zero beat" condition is achieved as evidenced by a set of horizontal lines within a bipolar pulse. Ensure that a clear "zero beat" can be observed. Waveform should conform to figure 2-4. Ensure the Display reading changes by no more than 300 kHz when placing the DISPLAY SELECT switch to CW SIG GEN and SIG GEN MODE SELECT switch to CW.

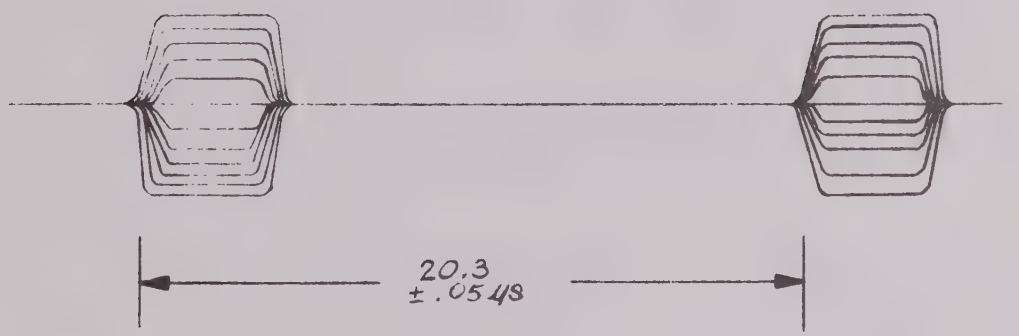


Figure 2-4. Transfer Oscillator Output

o. Place DISPLAY SELECT switch to PULSED EXT. Adjust TRANSFER OSC COARSE potentiometer through its range and ensure Display changes from less than 1045 MHz to greater than 1115 MHz.

p. Place TRANSFER OSC HI/LO switch to LO position. Ensure Display changes from less than 1005 MHz to greater than 1045 MHz when rotating TRANSFER OSC COARSE potentiometer through its range.

q. Connect the HORIZ OSCILLOSCOPE OUTPUT to the Scope Main Trigger Input. Adjust the scope controls for sweep operation.

r. Connect a BNC cable from VERT OSCILLOSCOPE OUTPUT to channel "A" of the scope. Set the scope Vertical Gain control to 2 volts/div. Set the DISPLAY SELECT switch to CW MARKER.

s. Viewing the channel "A" signal on the scope, adjust the "horizontal position" on the scope and the SAWTOOTH AMP potentiometer so that the horizontal line covers the whole screen and extends over the last vertical line on the left side of the screen and the last vertical line on the right side of the screen by approximately 5% of the total display. Sweep time starts at the point where the trace intensifies.

t. Adjust the MARKER FREQ potentiometer until the Display indicates 1010 ± 0.05 MHz. Place the SIG GEN MODE SELECT switch to SWEEP and adjust START FREQ potentiometer until marker is located on last vertical line on the left side of oscilloscope screen.

u. Adjust the MARKER FREQ potentiometer until the Display indicates 1050 ± 0.05 MHz. Adjust SWEEP WIDTH potentiometer until Marker is located on last vertical line on the right side of the screen. The waveform should conform to figure 2-5.

v. Repeat steps t and u until marker is placed in its proper position on each end of the oscilloscope screen.

w. Adjust MARKER FREQ potentiometer until the Display indicates 1030 ± 0.05 MHz. Observe Marker position deviates by no more than ±3% from the center of screen.

x. Repeat steps t, u, v and w except that 1010 MHz is replaced by 1070 MHz; 1030 MHz is replaced by 1090 MHz; and 1050 MHz is replaced by 1110 MHz.

y. Set the MARKER FREQ potentiometer for a Display reading of 1030.00 ± .05 MHz. Set SWEEP WIDTH potentiometer fully counter clockwise. Adjust START FREQ potentiometer until marker is centered on screen.

z. Determine sweep width displayed on screen by adjusting Marker from one side of screen to the other, using the MARKER FREQ control. Observe sweep width to be less than 100 kHz at 90% amplitude points. Observe that Display "zeroizes" when MARKER AMP is turned OFF.

a.a. Place DISPLAY SELECT switch to CW 1030 MHz CAL. Observe a reading of 1030.00 MHz on the Display.

b.b. Place DISPLAY SELECT switch to CW EXT. Place jumper cable between 1-20 MW EXT PWR IN and SIG GEN OUT ports. Place SIG GEN MODE SELECT switch to CW. Adjust SIG GEN FREQ potentiometer for a Display of 1115.00 ± 1 MHz. Observe that reading changes by no more than 50 kHz while SIGNAL GENERATOR LEVEL attenuator is rotated from -3 to -6 dBm.

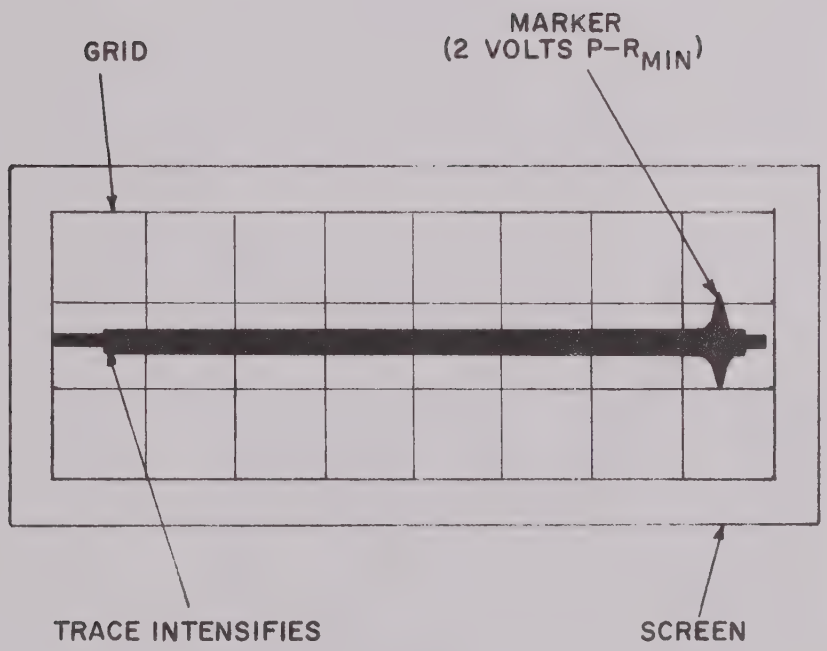


Figure 2-5. Marker Output

c.c. Repeat step b.b. except replace 1115 MHz with 1005 MHz.

d.d. Observe that as jumper cable is disconnected Display "zeroizes".

e.e. Terminate both SIG GEN IN and 1-20 MW EXT PWR IN ports with their front panel terminations. Apply the output of the High Power Pulsed Source (power in the range of 350 to 3500 watts) to the HIGH POWER INPUT jack at a maximum average power of 15 watts. Observe that the waveform at POWER CAL OUT is greater than or equal to 100 millivolts when terminated in 75 ohms. Power measurement can be made by use of calibration chart.

f.f. Decrease input power by 10 dB and apply High Power Source to MEDIUM POWER INPUT. Observe POWER CAL OUT to be greater than or equal to 100 millivolts.

g.g. Decrease input power by an additional 10 dB and apply High Power Source to LOW POWER INPUT. Observe an output greater than or equal to 100 millivolts. Turn off and disconnect the High Power Source from the test set up.

h.h. Connect HORIZ OSCILLOSCOPE OUTPUT on the CRF to a Vertical input channel of the scope. Adjust scope to trigger internally on applied waveform. Ensure that the waveform observed conforms to that shown in figure 2-6 when SAWTOOTH AMP control is fully clockwise.

2-13 ADJUSTMENTS

2-13.1 Link Settings

There are two solderless links located on the A4 Frequency Counter card. The first link (J1, J2, J3) provides the enabling or disabling of the Display "lockout" feature. The link

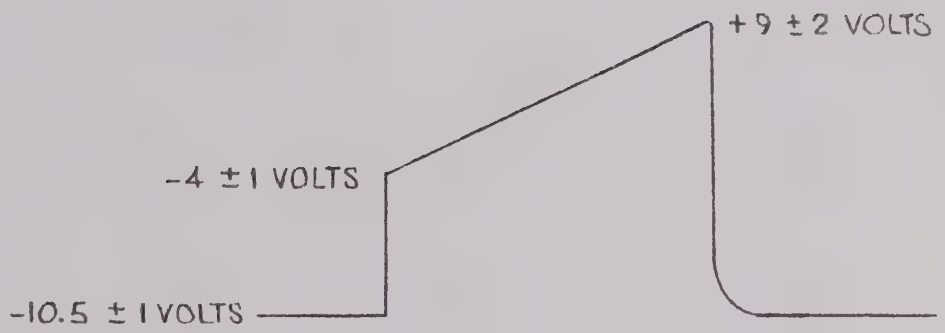


Figure 2-6. Sawtooth Output

is normally connected between J1 and J3 which enables the "lockout" feature. The second link (J4, J5, J6) provides enabling or disabling of a Frequency Discriminator feature. Since there is no Frequency Discriminator employed in this system this feature should always be disabled (J4 connected to J5).

2-13.2 Internal Adjustments

2-13.2.1 Certain adjustments are provided for alignment. All plug-in printed-circuit card adjustments are through the use of screwdriver adjusted potentiometers. Adjustments are made without removing any plug-in card. Other adjustments are necessary for alignment of the RF portions of the CRF. These adjustments are mainly the tuning of trimmer capacitors. This type of adjustment requires a tuning tool.

2-13.2.2 The adjustments perform the following functions.

a. -5.2 Volt Adjustment (A1A1R1) Monitor 1A1A1TP3.- This control is adjusted to set the -5.2 volt supply at -5.2 ±0.05 volts.

b. +28 Volt Adjustment (A2R1) Monitor A2TP1.- This control is adjusted to set the +28 volt supply to 28.0 ±0.1 volts.

c. Code Spacing Adjustment (A3R2) - This control adjusts the spacing of the internally generated code train for 1.45 μs between adjacent pulses.

d. Code Width Adjust (A3R3) - This control is adjusted to produce 0.45 μs pulse widths for the internally generated code train at SIG GEN OUT.

e. External Code Width Adjustment (A3R1) - This control is adjusted to produce a 0.45 μs pulse width at SIG GEN OUT for a 0.45 μs pulse width of an external code train input.

f. 10 MHz Oscillator Frequency Adjustment (A4C1)- This control is adjusted to produce 10.0000 MHz at A4TP1.

g. Oscillator Frequency Adjustment (A5TB1C5) - This control is adjusted to produce a 242.500 MHz signal at the output of the X3 multiplier.

h. X3 Multiplier Power Adjustment (A5C7) - This control is adjusted to produce maximum power at 970 MHz LO OUT at A5J3.

i. SRD Multiplier Power Adjustment (A5C10) - This control is adjusted to produce maximum power at 970 MHz LO OUT at A5J3.

j. VCO Frequency Adjustment (A5TB5L8) - This control is adjusted to provide the proper frequency range of the Voltage Controlled Oscillator signal appearing at HP OUT (A5J1).

k. Counter Sensitivity Control (A6TB1R1) - This control is adjusted to provide maximum sensitivity for the CW mode of frequency counting and is set to provide a stable count on the Display while monitoring the SIG GEN OUT port.

CPG-6
UNIT 70
23 DECEMBER 1974

SSR DECODER VIDEO TEST SET

CARDION MODEL NO. CPG-6

Cardion ELECTRONICS • A UNIT OF GENERAL SIGNAL CORPORATION

LONG ISLAND EXPRESSWAY WOODBURY N.Y. 11797 U.S.A. TWX 510-221-2179 516-921-7300

CPG-6
UNIT 70
23 DECEMBER 1974

SSR DECODER VIDEO TEST SET

CARDION MODEL NO. CPG-6

PREPARED BY:

CARDION ELECTRONICS
LONG ISLAND EXPRESSWAY WOODBURY, L. I., NEW YORK 11797

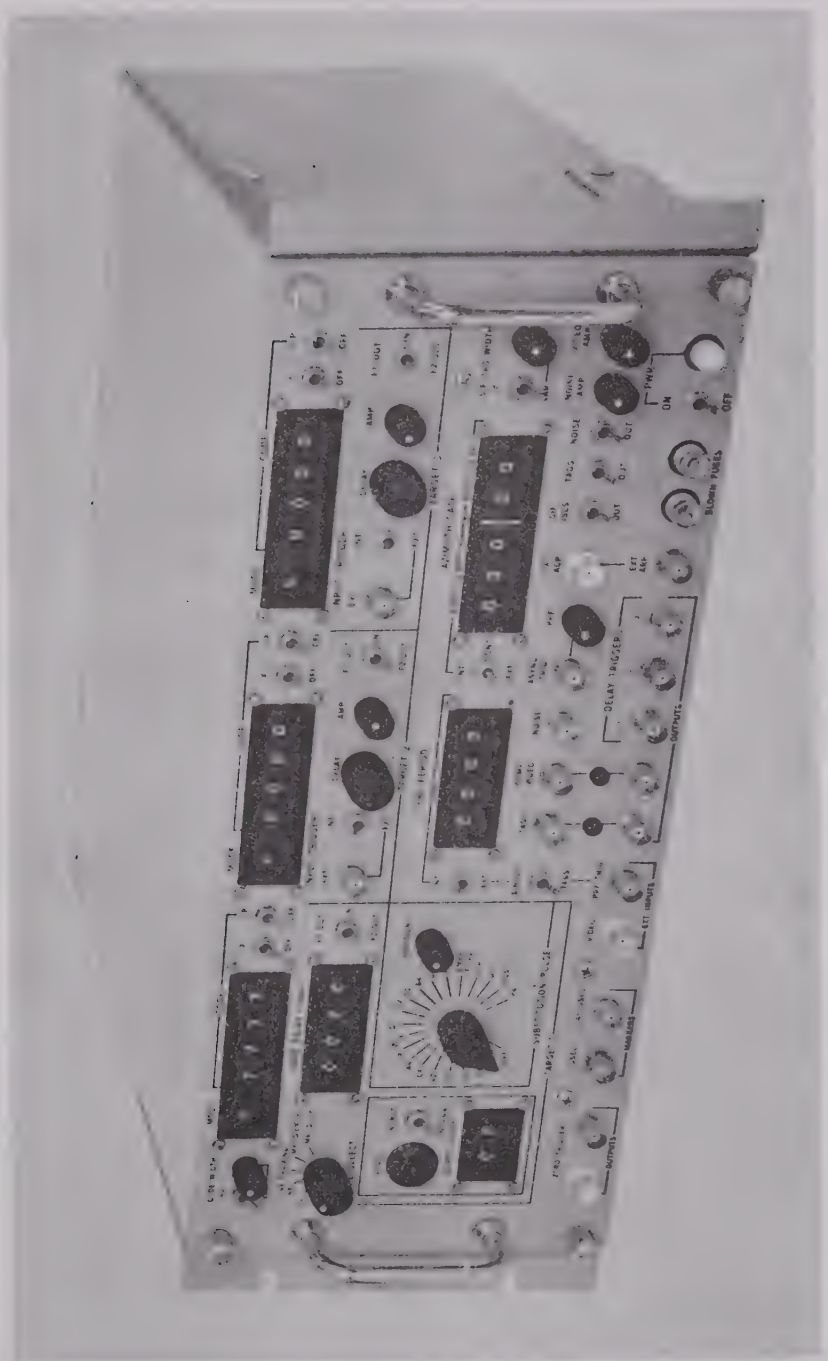


Figure 1-1. SSR Decoder Video Test Set

SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION

This technical manual provides the information on installation, operation, and maintenance of the SSR Decoder Video Test Set, hereafter referred to as the Pulse Train Generator, PTG. The manual is divided into six sections which include general information, installation, operation, troubleshooting with circuit diagrams, maintenance and parts list. The PTG is manufactured by Cardion Electronics, a unit of the General Signal Corporation.

1-2. GENERAL DESCRIPTION

1-2.1 The PTG is an all solid-state digital test set that provides simulation of either an interrogator set and/or a transponder for testing the video portion of a Basic Mark 10 or Mark 10 IFF system.

1-2.2 The PTG contains a crystal oscillator that is used to generate the internal pulse repetition frequency (PRF), target 1 reply code, target 1 delay, and mode identification pulses with receiver reset gate.

1-2.3 The PTG has the capability of generating replies from up to three targets on modes 1, 2, 3/A, B, C, and D, with any code. Special features include variable pulse substitution, azimuth gate position and width control, reply bursting, noise generator, asynchronous trigger generator, and Basic Mark 10 reply codes.

1-3 DESCRIPTION OF UNIT

1-3.1 The PTG may be rack or platform mounted. The chassis can be extended on slides for servicing. All operating controls and test connectors are located on the front panel. The power connector and line fuses are located on the rear panel. The blown-fuse indicators are located on the front panel.

1-3.2 The PTG consists of twelve plug-in printed circuit card assemblies and a power supply module. The power supply module generates all DC voltages and contains a single plug-in printed circuit card.

1-3.3 The printed circuit cards are provided with extractor lifts to facilitate removal. All alignment and test points are accessible without extending the cards. However, an extender card is provided for further troubleshooting.

1-3.4 The PTG is supplied to provide test capabilities on modes 1, 2, 3/A, B, C and D only.

1-4 REFERENCE DATA

Reference Data for the PTG is given in table 1-1.

Table 1-1 Reference Data for
SSR Decoder Video Test Set

Item	Characteristic	Capabilities and Limitations
Input Power	Line Voltage	220 or 115 VAC ± 10%; 45 to 440 Hz; 40 watts;
EXT PRF Trigger Input	Polarity Amplitude Risetime Falltime Duration Termination	Positive 5 to 50 volts 0.2 µs maximum 0.2 µs maximum 0.2 to 15 µs 75 ohms
External Video Input	Polarity Amplitude Termination	Positive 0 to 6 volts 75 ohms
External Trigger Inputs	Polarity Amplitude Duration	Positive 5 to 50 volts 0.2 to 15 µs
Delay Trigger Outputs	Polarity Amplitude Risetime Falltime Duration Delay Range: Target 1 Targets 2 and 3	Positive 9 ± 2 volts into 0.1 µs maximum 75 0.2 µs maximum ohms 10 µs, nominal 1 to 9999 µs in respect to Zero Trigger. NOTE: This trigger is bursted when the BURST/NORMAL switch is set to BURST. 0 to 90 µs with respect to Target 1 Delay Trigger
Zero Trigger Outputs	Polarity Amplitude Risetime Falltime Duration	Positive 9 ± 2 volts 0.1 µs maximum into 0.2 µs maximum 75 10 µs, nominal ohms

Table 1-1 Reference Data for
SSR Decoder Video Test Set

Item	Characteristic	Capabilities and Limitiations
Marker Outputs	Tolerance	1.00 ± .01 µs, 1.45 ± .01 µs
	Polarity	Positive
	Amplitude	2 ± 0.5 volts into
	Risetime	30 ns, maximum 75
	Falltime	30 ns, maximum ohms
	Duration	80 ns, nominal
Tags Output	Coding	Modes 1,2,3/A,B,C and D with receiver reset gate (link selected)
	Polarity	Positive
	Amplitude	9 ± 2 volts
	Risetime	0.1 µs maximum into
	Falltime	0.2 µs maximum 75
	Duration	0.8 ± 0.1 µs ohms
Compositive Video Outputs	Polarity	Positive
	Amplitude	0 to 5 ± 1 volts into
	Risetime	0.1 µs maximum 75
	Falltime	0.2 µs maximum ohms
Asynchronous Trigger Outputs	Polarity	Positive
	Amplitude	9 ± 2 volts into
	Risetime	0.1 µs maximum 75
	Falltime	0.2 µs maximum ohms
	Duration	10 µs nominal
	PRF	250 to 1000 pps
Noise Output	Polarity	Positive
	Amplitude	0 to 5 volts into 75 ohms
Environmental Limitation	Temperature	0° to 50°C
	Humidity	0 to 70%
Weight	32 lb	
Dimensions	18 in. deep X 19 in. wide X 7 in. high	

1-5. EQUIPMENT SUPPLIED

The equipment supplied with the PTG is listed in table 1-2.

Table 1-2. Equipment Supplied with the SSR Decoder Video Test Set

Quantity	Nomenclature	Part Number	Comments
2	Video Cable	102444-8	12 inches
3	Video Cable	102444-7	10 feet
1	Power Cable	102445 G1	Mates with J18
1	Technical Manual		
1	Conversion Chart	504369	
1	Container	504056G2	

1-6. EQUIPMENT REQUIRED BUT NOT SUPPLIED

The equipment required for a complete operational installation of the PTG, but not supplied with the PTG, are listed in table 1-3.

Table 1-3. Test Equipment Required but not Supplied with the SSR Decoder Video Test Set

Quantity	Name	Designation	Required Use
1	Multimeter	AN/USM-311 or equiv.	Check voltages and resistances
1	Oscilloscope	AN/USM-281 or equiv.	Waveform observation
1	Pulse Generator	SG-816/U or equiv.	Check trigger inputs
1	Universal Counter	HP 5300A/5302A or equiv.	Check frequency and intervals

SECTION II

INSTALLATION

2-1 GENERAL

2-1.1 The PTG provides signals for the complete testing of the video portion of an IFF system.

2-1.2 The PTG may be rack or platform mounted.

2-2. UNPACKING AND HANDLING

The PTG requires no special instruction for unpacking or handling.

2-3 SITE SELECTION

There are no specific site selection requirements for the PTG, however, it can be installed near the equipment it will most frequently test. The PTG can also be used as a portable unit.

2-4 POWER REQUIREMENTS AND DISTRIBUTION

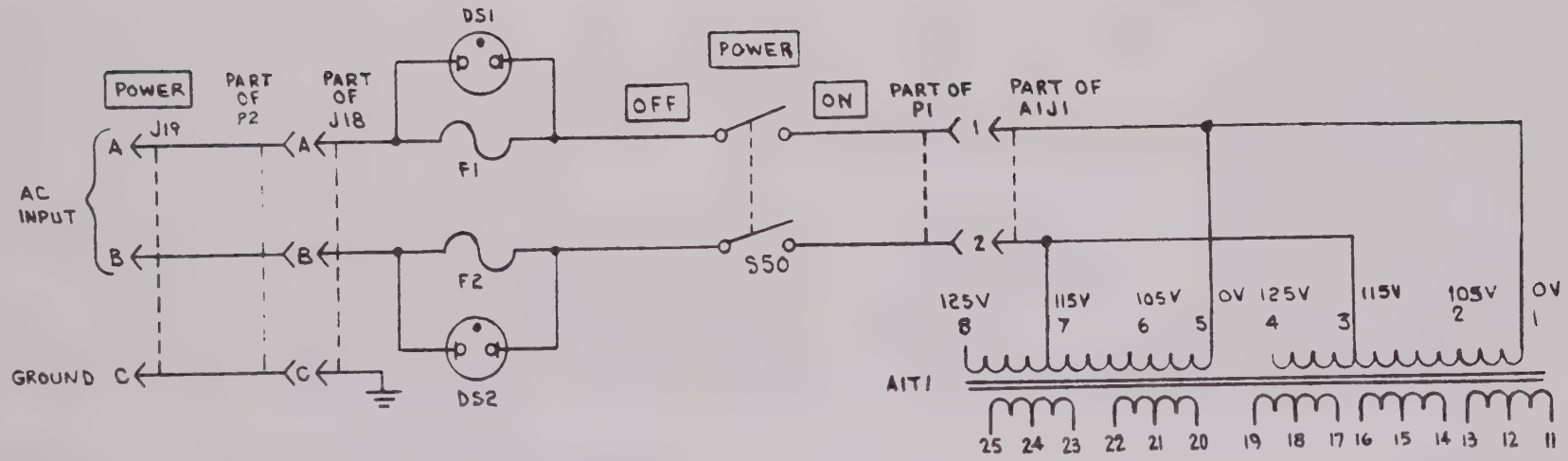
The PTG is designed to operate from a single power source of 115 VAC or 220 VAC at 45 to 440 Hz.

CAUTION

1. The PTG is factory set for 115 VAC operation. Make the required wiring change for operation from 220 VAC. See figure 2-1.

2. Use only 1 ampere fuses for 115 VAC or 0.5 ampere fuses for 220 VAC. Under no circumstances, replace the fuses in this equipment with a fuse of excessive rating. This could seriously damage the power transformer and the various other components in the power supply.

2-4.1 A tapped primary is provided to permit operation at line voltages different from the nominal values. The total power required is approximately 40 watts. Refer to figure 2-1 for primary power distribution information and transformer connections.



NOTE: (1) EQUIPMENT IS FACTORY WIRED AS SHOWN FOR 115 VAC

(2) USE 0.5 A FUSES FOR 220 VAC OR 1.0 A FUSES FOR 115 VAC.

A1T1 PRIMARY CONNECTIONS

LINE VOLTAGE	CONNECTIONS		
	A1J1-1 to	A1J1-2 to	A1T1 Terminal Connections
105 VAC	A1T1-1, A1T1-5	A1T1-2, A1T1-6	-
115* VAC	A1T1-1, A1T1-5	A1T1-3, A1T1-7	-
125 VAC	A1T1-1, A1T1-5	A1T1-4, A1T1-8	-
210 VAC	A1T1-1	A1T1-6	2 to 5
220 VAC	A1T1-1	A1T1-7	2 to 5
230 VAC	A1T1-1	A1T1-8	2 to 5

*STANDARD FACTORY WIRING

Figure 2-1. Primary Power Distribution

2-5. INSTALLATION LAYOUT

2-5.1 The PTG can be permanently installed near the equipment it will most frequently test. Outline dimensions and recommended mounting methods are shown in figure 2-2.

2-5.2 The PTG should be positioned so that all controls are accessible. Provision should be made to allow access to the rear panel power cable and to allow removal of the chassis from the case for service.

2-6. TERMINATIONS

Resistive terminations of 75 ohms at 1 watt are provided for the External Video Input and External PRF Trigger Input.

2-7. INSTALLATION REQUIREMENTS

2-7.1 The PTG can be synchronized to the IFF system by any of the following three methods:

a. The PTG can be used as the synchronizing source by setting the PRF switch to INT and using the ZERO TRIGGER as the system trigger.

b. The PTG can be synchronized to a trigger supplied to the PRF TRIG input. The SINGLE/TAGS switch should be set to SINGLE and the PRF INT/EXT switch set to EXT.

c. The PTG can be synchronized to mode identification pulse pairs applied to the PRF TRIG input. The SINGLE/TAGS switch should be set to TAGS and the PRF INT/EXT switch set to EXT.

With any of these methods the COMP VIDEO output is connected to the equipment under test. Tags may be applied to this signal, or a separate TAGS output is provided.

2-8. TEST FEATURES

Critical signals are brought to test points on each printed circuit card. A front panel test point is connected to the upper TAG connector. A similar test point is connected to the upper COMP VIDEO connector.

2-9. INSPECTION

After the PTG has been installed, set the power switch to OFF, pull out the front panel and chassis from the case, and inspect for any irregularities.

NOTE

Check each card to be certain that every card is correctly seated.

2-10. ENERGIZING EQUIPMENT FOR FIRST TIME

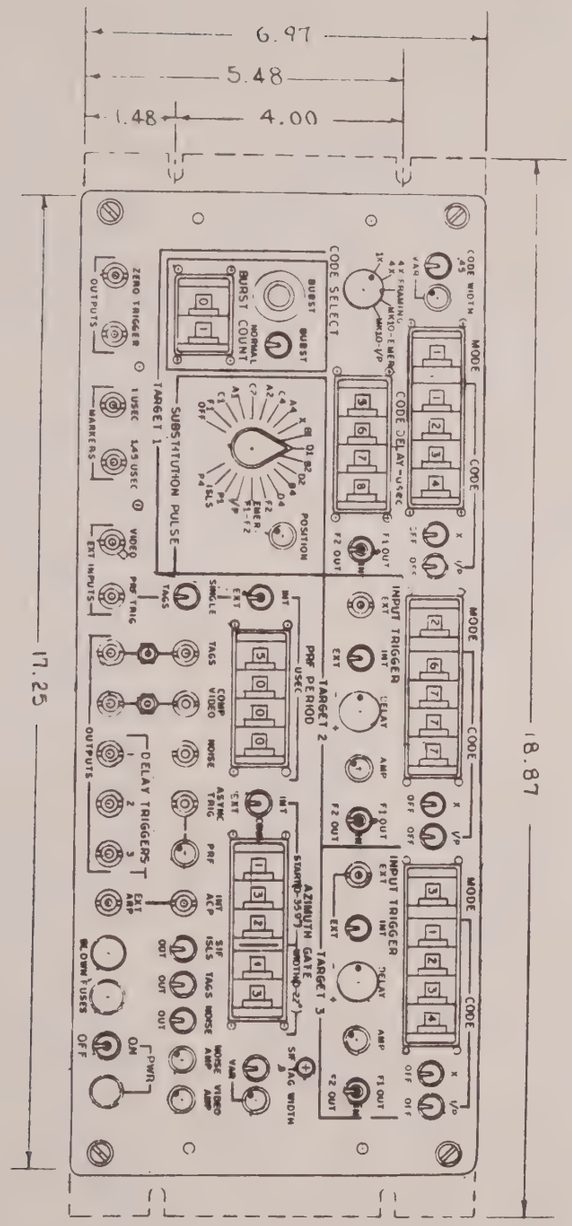
Use the following procedure for energizing the PTG for the first time:

a. Set the POWER switch to OFF.

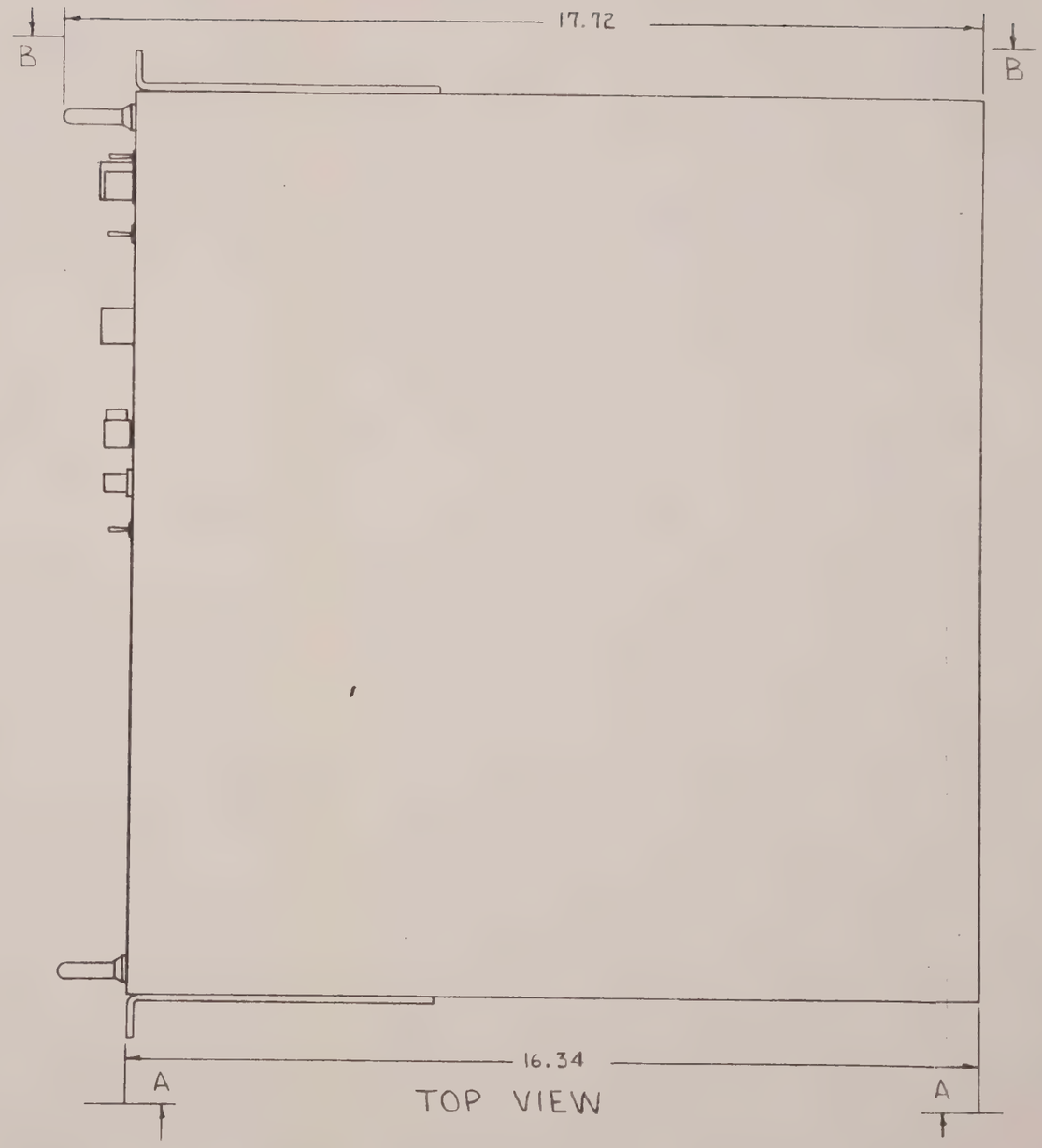
b. Measure the input a-c line voltage that will be used to power the PTG. This voltage must be within 10% of the voltage for which the PTG is wired. See figure 2-1. The taps to be used should be those which most closely match the measured voltage.

2-11. OPERATIONAL CHECKOUT AND INITIAL ADJUSTMENT

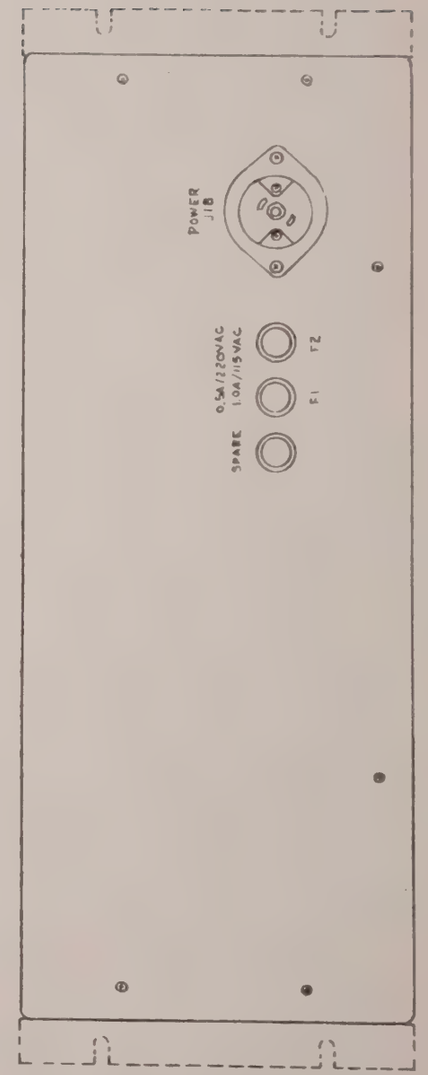
Before releasing the PTG for operation, perform the following operational checkout and adjustment procedure, to ensure that the equipment is operating properly. This procedure may also be used whenever there is a need to establish that the PTG is in full operational readiness. If abnormal performance is indicated during the checkout procedure, refer to the troubleshooting and maintenance routines in sections IV and V. All test equipment required to perform these checks is listed in table 1-3.



FRONT VIEW

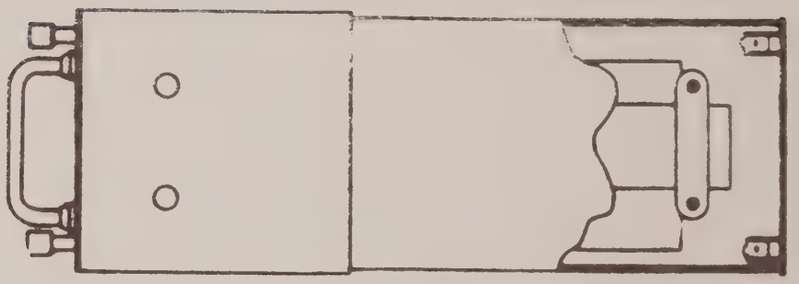


TOP VIEW



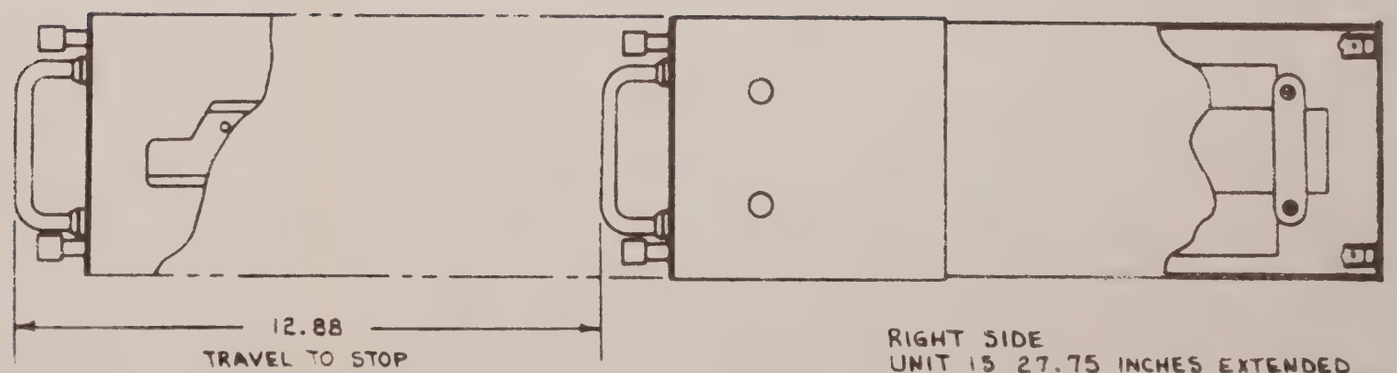
REAR VIEW

Figure 2-2 Outline and Mounting Dimensions (Sheet 1 of 2)



LEFT SIDE
FOR MOUNTING IN STANDARD 19 INCH RACK

VIEW B-B



RIGHT SIDE
UNIT IS 27.75 INCHES EXTENDED
29.06 INCHES WITH 1.00 INCH PAST ENCLOSURE

VIEW A-A

Figure 2-2. Outline and Mounting Dimensions (Sheet 2 of 2)

2-12 CHECKOUT PROCEDURES

a. Set all controls according to table 2-1.

Table 2-1. Control Settings for Checkout Procedure

Control		Setting
TARGET 1:	.45/VAR switch	.45
	MODE switch	1
	CODE switches	0000
	X switch	OFF
	I/P switch	OFF
	CODE SELECT switch	1X
	CODE DELAY switches	0200
	F1 OUT/F2 OUT switch	IN
	BURST/NORMAL switch	NORMAL
	SUBSTITUTION PULSE switch	OFF
TARGET 2:	MODE switch	1
	CODE switches	7700
	X switch	OFF
	I/P switch	OFF
	INT/EXT switch	INT
	DELAY pot	Midrange
	F1 OUT/F2 OUT switch	IN
	AMP pot	Fully clockwise
TARGET 3:	MODE switch	1
	CODE switches	7777
	X switch	X
	I/P switch	OFF
	INT/EXT switch	INT
	DELAY pot	Fully Clockwise
	F1 OUT/F2 OUT switch	IN
	AMP pot	Fully Clockwise

Table 2-1. Control Settings for Checkout Procedure (Cont.)

Control	Setting
PRF: PERIOD switches	1000
INT/EXT switch	INT
SINGLE/TAGS switch	SINGLE
SIF TAG WIDTH	.8
SIF ISLS IN/OUT switch	OUT
TAGS IN/OUT switch	OUT
NOISE IN/OUT switch	OUT
NOISE AMP pot	Fully Clockwise
VIDEO AMP pot	Fully Clockwise
INT/EXT/CONT Switch	CONT
AZIMUTH GATE START Switches	100
AZIMUTH GATE WIDTH Switches	18

b. Energizes the PTG.

c. Synchronize the oscilloscope with the ZERO TRIGGER and use the oscilloscope for all observations.

d. Terminate a COMP VIDEO OUTPUT with 75 ohms and observe the video signal. The waveform should conform with figure 2-3.

e. Vary the TARGET 2 and TARGET 3 AMP and DELAY controls. Observe the variations in delay and amplitude with respect to target 1. There should be no variation in target 1. Amplitude variation should be from 0 to 5 volts nominal.

f. Vary the VIDEO AMP control and observe that all code trains vary in amplitude.

g. Vary the settings of the X, I/P and F1 OUT/F2 OUT switches for each target and note that the corresponding pulses are added to or deleted from the particular code train.

h. Check the pulse width of the TARGET 2 and 3 replies. The width should be 0.45 $\pm$ 0.05 us.

i. Set the TARGET 2 and 3 MODE switches to OFF and the TARGET 1 CODE SELECT switch to 4X. Set the TARGET 1 CODE switches to 7700. Observe the figure 2-4 waveform.

j. Set the Target 1 code switches to 0000. Set the CODE SELECT switch to 4X FRAMING and observe the waveform of figure 2-5.

k. Set the SUBSTITUTION PULSE switch to EMER F1-F2 and vary the SUBSTITUTION PULSE POSITION control. Observe that the last three sets of F1-F2 pulses move in position with respect to the first set of F1-F2 pulses.

l. Check the TARGET 1 pulse width. The width should be 0.45 ± 0.05 μs.

m. Set the .45/VAR switch to VAR and vary the TARGET 1 WIDTH Control and observe that the pulse width changes.

n. Set the CODE SELECT switch to MK10-EMER and observe four 1 μs pulses spaced 16 μs.

o. Set the CODE SELECT switch to MK10-I/P and observe two 1 μs pulses spaced 16 μs.

p. Set the BURST/NORMAL switch to BURST. Set the Target 1 code switches to 7700. Set the BURST COUNT switch to 50. Set the CODE SELECT switch to 1X. Observe that code trains are generated only after BURST switch is depressed.

q. Set the TAGS IN switch to IN and observe that mode identification pulses plus the receiver reset gate are added to the target video.

r. Set the NOISE IN switch to IN and observe that noise is added to the video signal.

s. Remove the termination from the COMP VIDEO OUTPUT and terminate a TAGS output with 75 ohms. Observe the waveform of figure 2-6.

t. Advance the TARGET 1 MODE switch from 1 to 2 to 3A and observe that the mode ident spacing changes from 3 to 5 to 8 μs respectively. Set the switch to OFF. Repeat this for TARGET 2 and TARGET 3.

u. Remove the termination from the TAGS OUTPUT and terminate the NOISE OUTPUT with 75 ohms. Vary the NOISE AMP control and observe the variation in noise amplitude from 0 to 6 volts nominal.

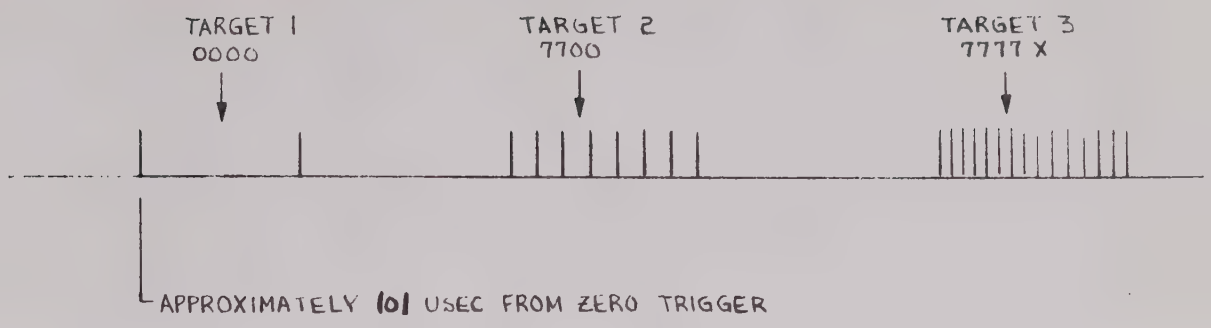


Figure 2-3 Composite Video Waveform

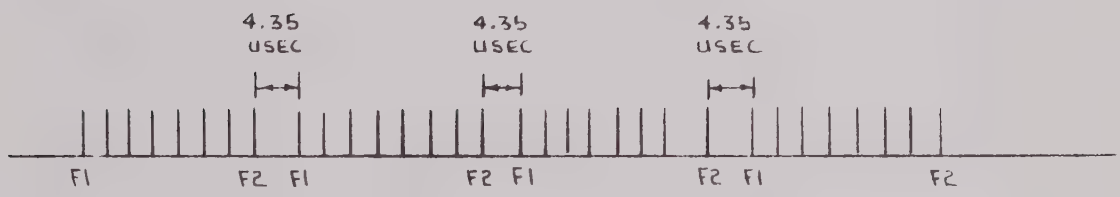


Figure 2-4 4X Code Train

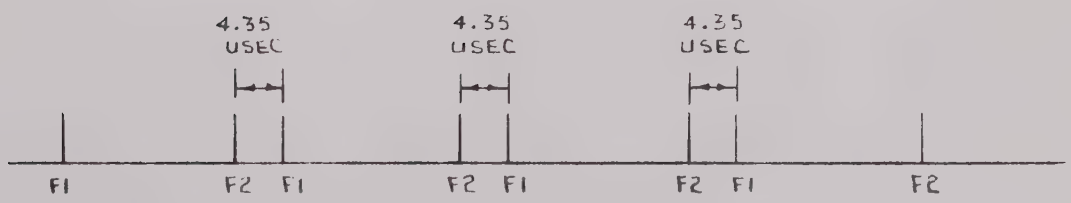


Figure 2-5 4X Framing Code Train

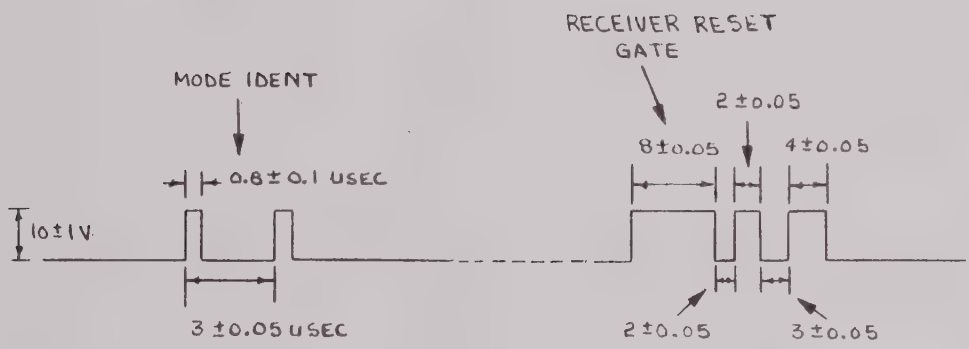


Figure 2-6. Tags Waveform

v. Remove the termination and terminate the 1 μs MARKERS OUTPUT with 75 ohms. Observe 2 ± 0.5 volt markers spaced 1 μs. Repeat for the 1.45 μs MARKERS OUTPUT and observe 2 ± 0.5 volt Markers spaced 1.45 μs.

w. Remove the termination and terminate the ASYNC TRIG OUTPUT with 75 ohms. Observe 10 ± 1 volts triggers with a period controlled by the PRF control.

x. Remove the termination and terminate a ZERO TRIGGER OUTPUT with 75 ohms. Observe 10 ± 1 volts triggers with a period controlled by the PRF PERIOD switches.

y. Set the signal generator for a 10 volts, 0.8 μs pulse. Connect the signal generator output to the EXT PRF TRIG INPUT on the PTG. Set the PRF INT/EXT switch to EXT. Observe the ZERO TRIGGER OUTPUT; the ZERO TRIGGER period follows the signal generator period as the signal generator frequency is varied.

z. Set the signal generator for a pulse pair spaced 3 μs. Set the SINGLE/TAGS switch to TAGS.

aa. Remove the ZERO TRIGGER termination and terminate a COMP VIDEO OUTPUT with 75 ohms. Set all MODE switches to OFF, COMP AMP control clockwise, TARGET 1 CODE SELECT switch to 1X and TARGET 1 CODE switches to 7700. Make observations at the COMP VIDEO OUTPUT.

ab. Observe a 7700 code train when the TARGET 1 MODE switch is set to 1 only. No train for settings of other modes.

ac. Set the signal generator to a pulse spacing of 5 μs and similarly observe a code train only for a MODE setting of 2.

ad. Similarly set the signal generator to a pulse spacing of 8 μs and observe a code train only for a MODE setting of 3A.

ae. Set the signal generator to a pulse spacing of 17 μs and observe a code train only for a mode setting of B.

af. Set the signal generator to a pulse spacing of 21 μs and observe a code train only for a mode setting of C.

ag. Set the signal generator to a pulse spacing of 25 μs and observe a code train only for a mode setting of D.

ah. Set the INT/EXT/CONT switch to INT. Repeat steps ab thru ag, noting that the code train output in each case appears at the COMP VIDEO OUTPUT for a short time only (approximately 5% of the time).

2-13 ADJUSTMENTS

2-13.1 LINK SETTINGS

There is a solderless link located on the A12 Delay card. This link allows the receiver reset gate to be deleted from the tags signal. This link is factory set to enable the reset gate.

NOTE

Do not disable the receiver reset gate unless it is known that the decoding equipment to be tested cannot operate properly with the reset gate.

On A12, connecting J1 to J2 enables the reset gate and connecting J1 to J3 disables the reset gate.

2-13.2 INTERNAL ADJUSTMENTS

2-13.2.1 Certain adjustments are provided for alignment. All adjustments are through the use of screwdriver adjusted potentiometers located on the printed circuit cards. Adjustments are made without removing any card.

2-13.2.2 The adjustments perform the following functions.

a. Azimuth Gate repetition rate adjustment (A3R1) - This control is adjusted to vary the internal azimuth count repetition rate between 409.6 and 1024 PPS. This frequency is counted down to produce 6-15 PPM at A3TP2 to correspond to antenna rotation speeds of 6-15 RPM.

b. Mark 10 Code Width Adjustment (A4R1) - This control is adjusted to produce a Mark 10 code pulse width of 1 µs at the COMP VIDEO OUTPUT.

c. Target 1 Code Width Adjustment (A6R1) - This control is adjusted to produce a SIF code pulse width of 0.45 µs at the COMP VIDEO OUTPUT when the .45/VAR switch is set to .45.

d. SIF Tag Width Adjustment (A6R3) - This control is adjusted to produce a SIF tag pulse width of 0.8 µs control at the COMP VIDEO OUTPUT when the SIF TAG WIDTH switch is set to .8.

e. Noise Gain Adjustment (A10R1) - This control is adjusted to produce 5 volts of noise at the COMP VIDEO OUTPUT when the VIDEO AMP and NOISE AMP controls are fully clockwise.

f. Target 2 Code Spacing Adjustment (A11R1) - This control is adjusted to produce a pulse spacing of 1.45 µs for the target 2 code train.

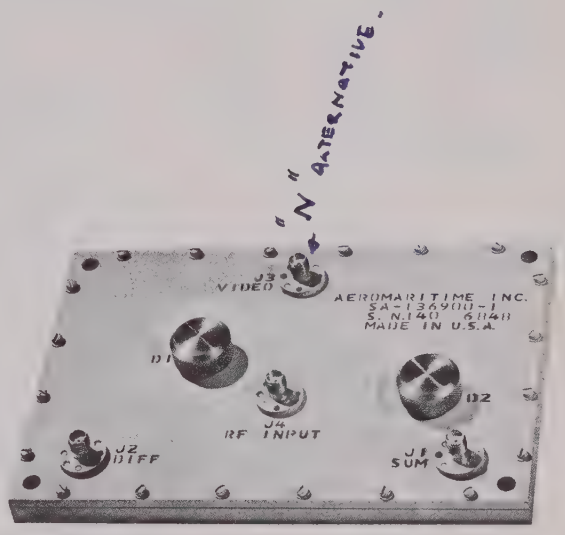
g. Target 2 Code Width Adjustment (A11R2) - This control is adjusted to produce a target 2 code pulse width of 0.45 µs at the COMP VIDEO OUTPUT.

h. Target 3 Code Spacing Adjustment (A11R3) - This control is adjusted to produce a pulse spacing of 1.45 µs for the target 3 code train.

i. Target 3 Code Width Adjustment (A11R4) - This control is adjusted to produce a target 3 code pulse width of 0.45 µs at the COMP VIDEO OUTPUT.

AEROMARITIME, INC.
1156 FIFTEENTH STREET, N.W. • WASHINGTON, D.C. 20005 U.S.A.
TELEPHONE 202-659-8140 • TELEX NUMBERS 24508/440127/64212 • CABLES: AVIONICS WASHDC

INTERROGATION SIDE-LOBE SUPPRESSION RF SWITCH SA-136900-1



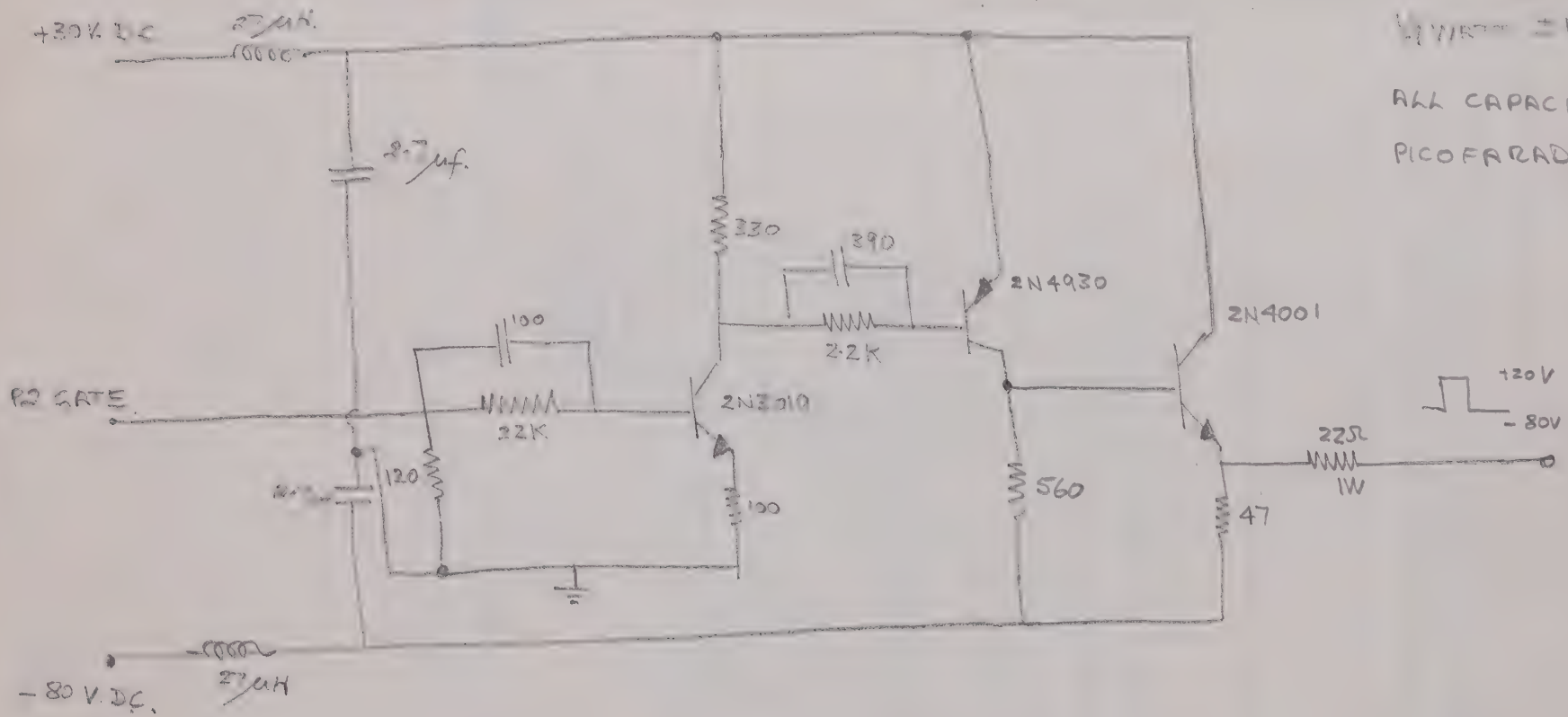
The SA-136900-1 solid-state RF switch is a high-speed PIN diode device especially designed for Aeromaritime for use with interogation side lobe suppression (ISLS) antenna systems. Functionally, the unit provides single-pole, double-throw switching of the antenna RF feed between the sum and difference pattern inputs of a dual-aperture ISLS antenna, or between directional and omnidirectional antennas. In the case of a sum-and difference type antenna, the switch is generally mounted on the rear of the antenna itself. With a system combining rotating directional antenna and a fixed omnidirectional antenna, the switch may be conveniently located at the base of the antenna pedestal or at the interrogator itself. In either case, operation of the switch is identical:

During the relaxed, or OFF state, a negative bias is applied to the VIDEO INPUT connector. Application of a positive-going dc pulse to the same input turns the switch ON for a time period approximating the length of the pulse. The bias and control pulses are normally produced by a compatible SLS switch driver circuit contained in the IFF interrogator or coder, or in a separate switch driver assembly and routed to the antenna via the RF transmission line, using suitable diplexers, or via a separate (coaxial) line. RF output from the interrogator is received at the RF INPUT jack of the SA-136900-1 switch, and in the absence of the positive-going dc switching pulse (OFF Condition) the RF is passed to the SUM output and is isolated from the DIFF output connector. With the arrival of a switching pulse, just preceeding transmission of the ISLS P2 RF pulse (second pulse of a 3-pulse mode interrogation), the switch goes into the ON condition and the P2 RF pulse is conducted to the DIFF output connector, from there to the difference pattern input of the ISLS antenna (of an omnidirectional antenna). The timing and duration of the switching pulse must be such that the switch is turned ON just before arrival of the P2 RF pulse, that it turns OFF with the end of the P2 RF pulse, in time for arrival of the 3rd RF pulse (P3). (Note that in the case of Mode 1, only 200 nanoseconds are available between the trailing edge of P2 and the leading edge of P3.)

The SA-136900-1 RF switch is designed to provide optimum performance under the most severe environmental conditions, and in service it has proven to be extremely reliable. Should diode failure occur, however, field replacement involves nothing more than unscrewing the retaining cap and replacing the diode. The RF and video connectors are microminiature OSM female. Four corner-located holes are provided for mounting purposes.

OPERATING CHARACTERISTICS

Dimensions		
Length	:	6.00 inches (152 mm)
Width	:	4.00 inches (102 mm)
Height	:	0.83 inches (21 mm)
Weight	:	1 pound (.45 kg)
Electrical		
Operating Frequency	:	1030 ± 5 MHz and 1090 ± 5 MHz
Peak Power	:	2 kw (5 watts average) at 1030 ± 5 MHz, 1 watt at 1090 ± 5 MHz
VSWR	:	Not greater than 1.4:1
Insertion Loss	:	0.7 db (max) at 1030 MHz at both arms 0.7 db (max) at 1090 MHz at sum arm only
Isolation	:	23 db (min) at 1030 MHz at sum arm 25 db (min) at 1030 MHz at difference arm 15 db (min) at 1090 MHz measured at difference arm only
Switching Speed-ON to OFF (from Difference to Sum)	:	Not greater than 200 nanoseconds from 0.5 db above insertion loss to 20 db isolation at 1030 MHz
Switching Speed-OFF to ON (from Sum to Difference)	:	Not greater than 1 microsecond
Duty Cycle	:	Switch ON (drawing current): 0.1% (max)
Switching Current	:	The device shall be switched ON when provided with not less than +100 and not more than +300 milliamp current. The device is warranted not to be damaged by a 2 ampere current pulse of less than 100 nanoseconds duration in either direction.
Hold Off Voltage	:	The device is switched OFF by all voltages between -68 and -180 VDC at not greater than 300 microamps current.
Environmental		
Operating Temperature	:	-54 to +85°C
Humidity	:	To 100% per procedure 1 of MIL-E-5272
Rain	:	8 inches/12 hours, including 4 inches/1 hour, 1 inch/10 minutes, 0.45 inch/1 minute
Ice	:	0.25 inches accumulation
Sand and Dust	:	Per procedure 1 of MIL-E-5272 except with wind velocity of 2,300 ft/min and high temperature of 125°F
Salt Sea Atmosphere	:	20% salt spray solution for 50 hours
Altitude		
Operating	:	10,000 feet
Non-Operating	:	40,000 feet
Vibration	:	± 2.5 G from 10-36 cps. 0.036 inches double amplitude 36 to 46 cps. ± 4.0 G from 46 to 300 cps.
Shock	:	15 G half-sinusoidal pulse of 11 + 1 millisecond duration



ALL RESISTORS IN OHMS
½ WATT ±10%

ALL CAPACITORS ARE IN
PICOFARADS ±5%

SLS. SWITCH DRIVER CIRCUIT.
SOC DRAWINGS SA-136900-1 AND SA-136900-3.

$t_w = K R_t C \left(1 + \frac{0.7}{R_T}\right)$

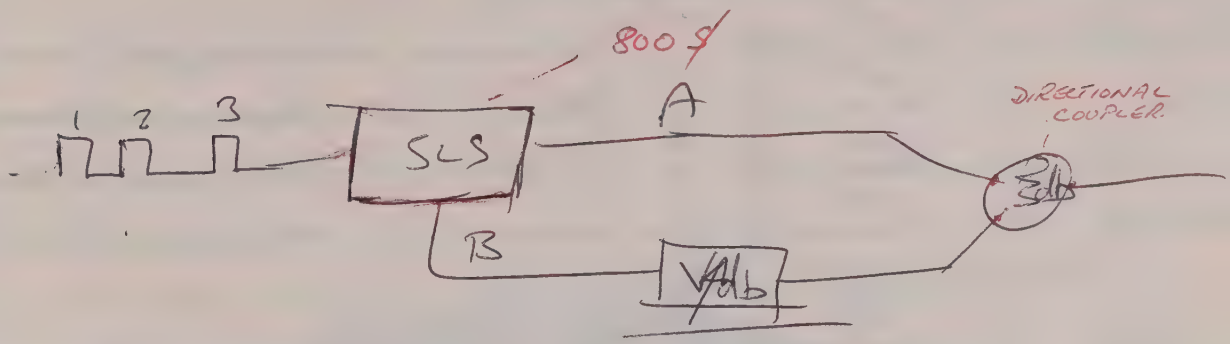
$\frac{50\,000\,000}{} = 0.2827$

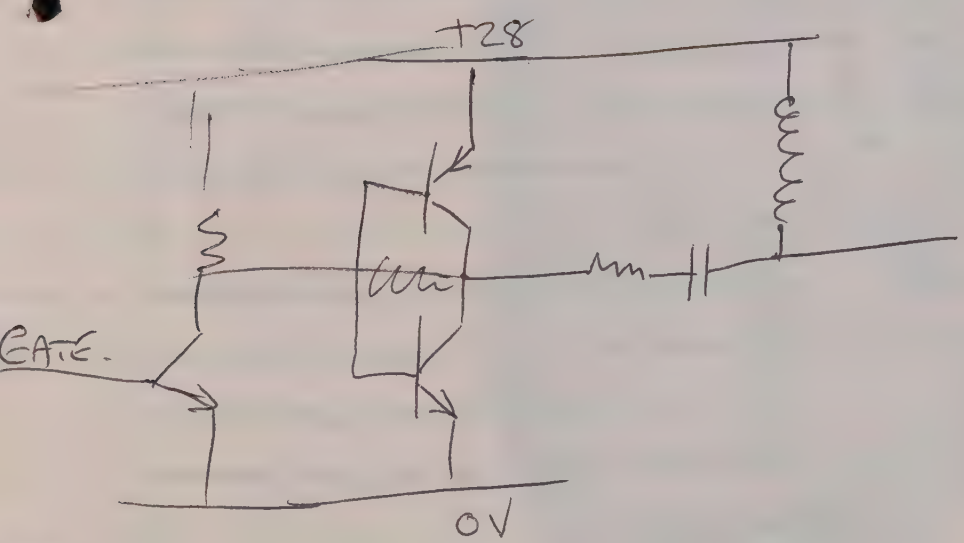
$0.28.27. \left(1 + \frac{0.7}{27}\right) = C.\,pf$ ...

6.4 mfd.

+30V ... SIZE 4×6", 3/8"

−60V DRIVE ... OSMOR TYPE N





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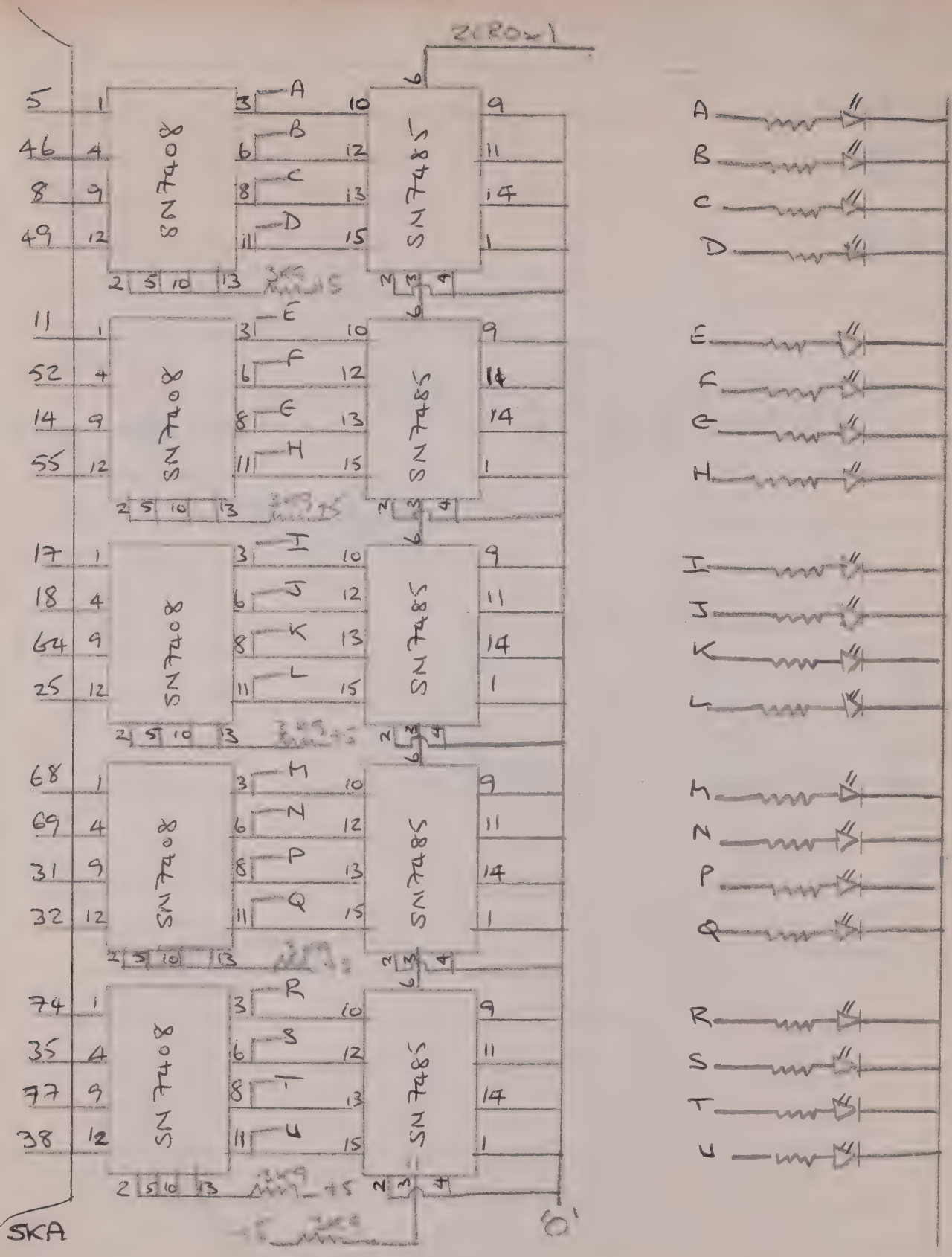


TEST SET FOR
RELAY CARD (419/03287) TEST SET

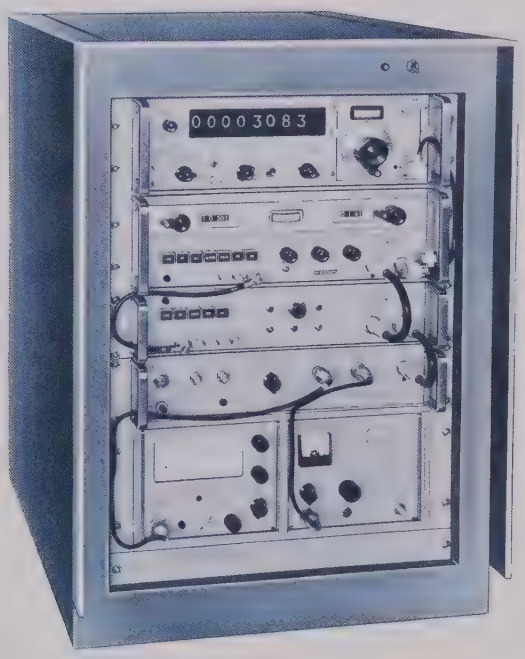
sheet 1

HEWLETT hp PACKARD

DME/ATC TEST SET

MODEL
8925A

TECHNICAL DATA OCTOBER 1970



Specifically designed for testing and calibrating DME and ATC Transponder aircraft equipment

Features

- Covers all present and proposed DME channels
- Provides proper DME pulse shape as specified in RTCA-167-59/DO-99
- Provides for simulation of TACAN bearing information
- Incorporates side lobe suppression capability (both 2 and 3 pulse)
- Measures transmitter power output to ± 0.6 dB
- Provides direct readout of ATC reply frequency
- Includes both heterodyne and diode monitors for convenient pulse analysis

Description

The DME/ATC Test Set Model 8925A is specifically designed for the testing and calibration of DME (Distance Measuring Equipment) and ATC (Air Traffic Control) Transponder aircraft equipment. The test set is completely self-contained (except for video modulators) and consists of a continuously tuneable signal generator, direct reading frequency counter, solid-state modulator, frequency meter, peak power measuring system, and all necessary circuitry for interconnection to the equipment under test.

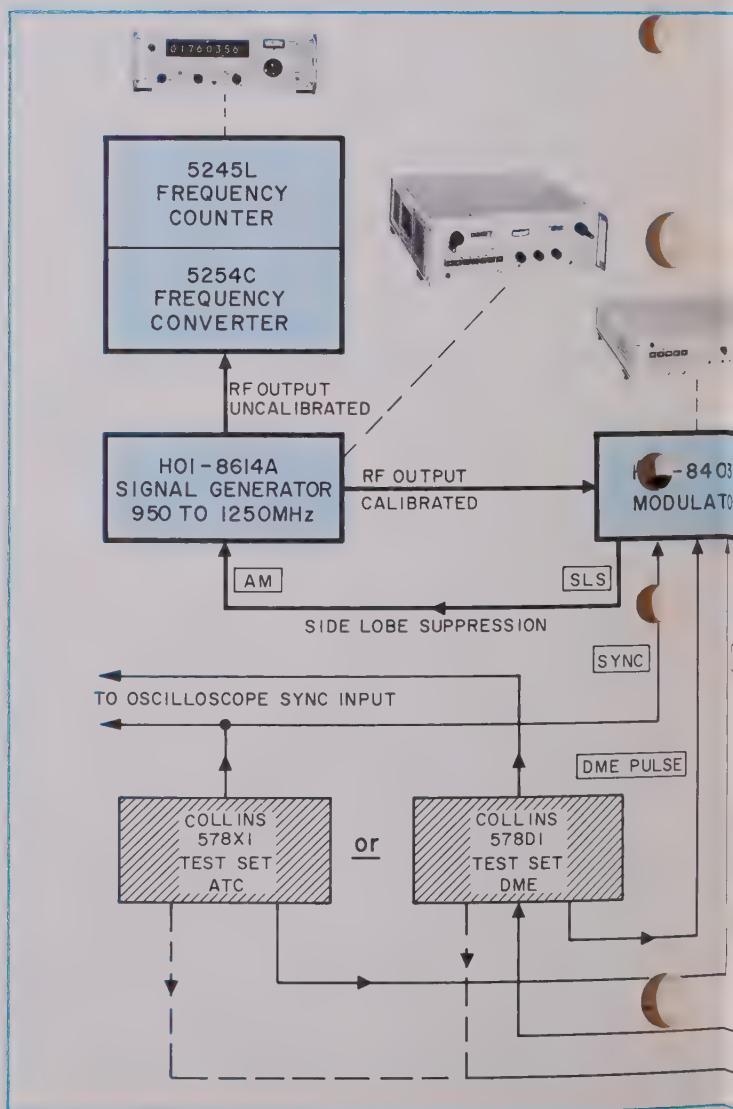
The basic test signal is generated by an HP HO1-8614A Signal Generator which covers the range 962 to 1213 MHz. The test frequency is indicated approximately on the front panel dial of the signal generator and is simultaneously monitored and indicated on an HP 5245L solid-state Electronic Counter employing a 5254C Frequency Converter. Frequency may be set to within 50 kHz with the Δf on the HO1-8614A. The RF output of the signal generator is automatically leveled, eliminating the need to set to "red line" as frequency is varied and the output attenuator is calibrated to read out directly the applied signal level to the equipment under test over the range from —10 to —100 dBm.

The CW output of the signal generator is modulated by an HP HO1-8403A Modulator employing PIN diodes as modulator elements. Pulsed video test signals simulating DME/ATC ground emission are fed to the modulator from either an external Collins Radio 578D-1 Test Set (DME) modified for Gaussian pulse output, or 578X-1 Test Set (ATC). The modulator also incorporates complete provisions for side-lobe suppression measurements in that the second pulse of a train of two or three pulses may be varied over the range +1 to —10 dB from the first pulse with a calibrated front panel control. TACAN bearing information may also be simulated employing an external audio frequency source.

The modulated RF output is fed into an HP 13505A Isolator-Monitor which performs three separate functions. Isolation is provided for the high power transmitter output of the equipment under test by a microwave circulator, protecting the signal generator and modulator. Auxiliary calibrated RF outputs are provided for operation of the frequency meter and peak power measuring system. The Isolator-Monitor also incorporates both a diode and a linear heterodyne monitor for viewing the pulsed RF test signals on an external oscilloscope, such as the HP 140A or 180A. Switching from the normal operating mode to the monitoring mode is simply accomplished by operating a front panel control which activates an internal electrically-operated coaxial switch. A transmitter interlock is provided via rear terminals for de-energizing the DME/ATC tansmitter when the test set load is removed from the antenna of the equipment under test.

The HP 8905A Wavemeter, is a self-powered transmission wavemeter and provides direct measurement to ±0.5 MHz of the ATC reply frequency over the range from 1070 to 1110 MHz. Response of the wavemeter is directly indicated on a front panel meter.

The HP 8900B Peak Power Calibrator provides complete facilities for measuring the peak power output of DME and ATC transmitters over the range from 10 to 2000 watts. In operation, an external oscilloscope is connected to the video output, the front panel controls are adjusted by observing the oscilloscope display and the peak power is read directly on the panel meter. The calibrator also incorporates a wide-band detector for viewing transmitter waveforms on an external oscilloscope. This output also provides a reply signal for DME distance measurements. The individual modules are mounted in an enclosed rack cabinet which includes a master power distribution system and forced air cooling. All necessary interconnecting cables are included.



Specifications

Radio Frequency Characteristics

RF range: 962 to 1213 MHz.

RF accuracy: determined by ability to set to desired reading on counter.

RF settability: better than 100 kHz.

RF stability:
Temperature: approximately 0.005% per degree C.
Line voltage: <0.003% (±10% line voltage change).

RF output:
Range: —10 to —100 dBm across external 50-ohm load at output jack.

Accuracy:

Attenuator setting	ATC (1015 to 1045 MHz)	DME (962 to 1213 MHz)
—10 to —17 dBm	+0.7 to —1.6 dB	+1.1 to —2.0 dB
—17 dBm	±0.6 dB	±1 dB
—17 to —100 dBm	± (0.8 ±0.06 per 10 dB) dB	± (1.2 ±0.06 per 10 dB) dB

Leveled output (fixed attenuator position): ATC, ±0.2 dB; DME, ±0.6 dB.

Impedance: 50 ohms.

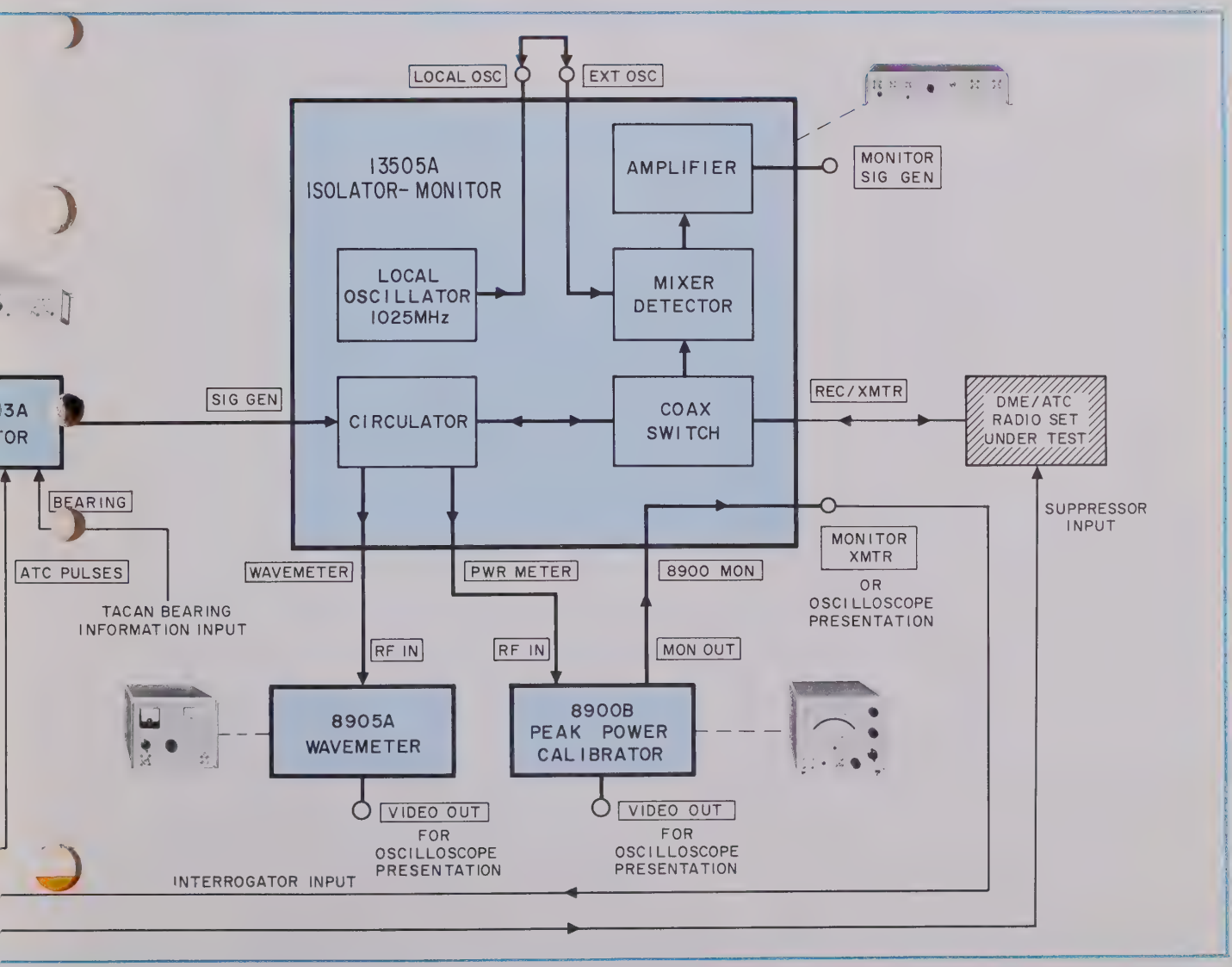
VSWR: <1.35:1.

Pulse Modulation Characteristics

PM source: simulation of DME/ATC ground emission as provided by Collins 578X1 and 578D1 (modified for Gaussian pulse) Test Sets or equivalent.

Pulse shape:

	ATC	DME
Risetime	>50 ns and <100 ns	controlled by pulse source to meet pulse shape spec., Sec. G, Appendix A, RTCA 167-59/DO-99
Falltime	>50 ns and <200 ns	controlled by pulse source to meet pulse shape spec., Sect. G, Appendix A, RTCA 167-59/DO-99
Overshoot	<5%	not meaningful



Specifications

Side-lobe suppression: The second pulse of a train of 2 (or 3) pulses may be varied +1 to —10 dB from the first pulse when its leading edge is ≧2 μs from the first pulse leading edge; calibrated SLS control accurate to +0.5 dB.

Simulated bearing input: audio frequency input to BNC jack under TACAN button will simulate bearing modulation to a depth of 55% maximum (3.8 dB above pulse tips).

Power Measurement Characteristics

RF range: 962 to 1213 MHz.

RF power range: 100 to 2000 watts peak (ARINC units); 10 to 200/100 to 2000 watts peak (General Aviation and ARINC units) available as factory modification with accessory attenuator (option 003).

RF power accuracy: ±1.2 dB (±0.6 dB when using calibration chart supplied).

Frequency Measurement Characteristics

RF range: 1070 to 1110 MHz.

RF accuracy: ±0.5 MHz; direct meter indication for peak power 250 to 1000 watts at 25°C; video output for external scope indication for input peak power down to approximately 10 watts.

Monitor Characteristics

Signal generator and heterodyne monitors:
- **Frequency range:** 1018 to 1032 MHz (for beating oscillator 1025 ±1 MHz.
- **Output level:** 0.5 volt peak minimum at —10 dBm RF level (at IF center frequency).
- **Load impedance:** 150 ohms nominal.
- **Bandwidth:** 9 MHz nominal (equivalent low-pass bandwidth 4 MHz.
- **Linearity:** +0.5 dB (—10 to —20 dBm RF level).

Diode monitor:
- **Frequency range:** 962 to 1213 MHz.
- **Output level:** 0.1 volt peak minimum at —10 dBm RF level.
- **Low-pass bandwidth:** 5 MHz nominal.

Transmitter monitor:
- **Output level:** approximately 0.2 volt peak for 200 watts peak input (100 to 200 watts peak power range), 20 watts peak input (10 to 200 watts peak power range).
- **Load impedance:** 150 ohms nominal.
- **Bandwidth:** 10 MHz nominal.
- **Linearity:** ±1 dB for 200 to 2000/20 to 200 watts peak input.

Transmitter interlock: Terminals are provided for de-energizing the transmitter when the system internal load is removed from the transmitter antenna.

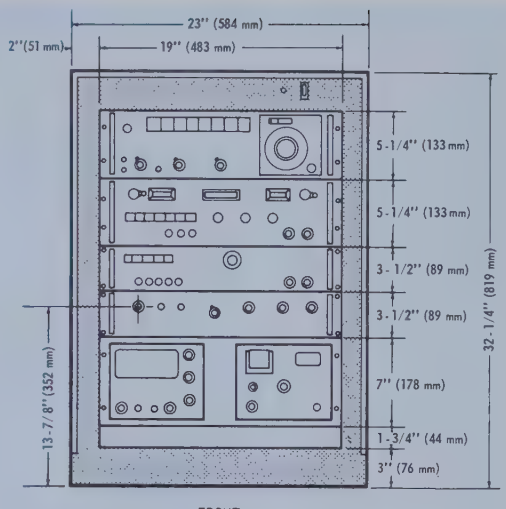
Weight: net 310 lbs (139,5 kg); shipping 350 lbs (157,5 kg).

Power: 105 to 125 or 210 to 250 volts, 50 to 60 Hz, 400 watts. A master circuit breaker/switch controls power to the complete rack.

Price: HP 8925A complete, $13,925.

Options: (specify by option number).
- 001: less 5245L/5254C Counter, deduct $3,575.
- 002: less cabinet, deduct $800.
- 003: dual power range (10 to 200/100 to 2000 watts), add $130.
- 004: HP 5246L Counter instead of HP 5245L, deduct $775.

Dimensions:



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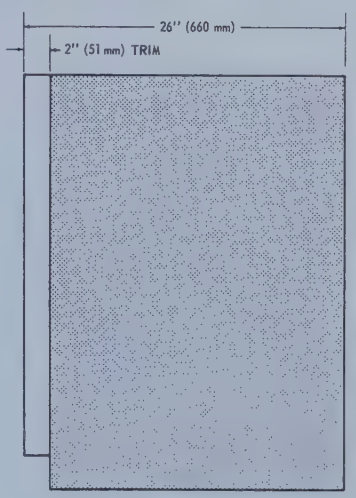

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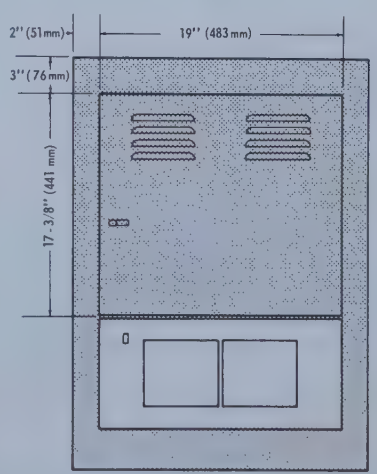

REAR

For more information call your local HP Sales Office or East (201) 265-5000 Midwest (312) 677-0400 South (404) 436-6181 West (213) 877-1282 Hewlett-Packard, New Jersey Division, 100 Locust Avenue, Berkeley Heights, New Jersey 07922. Telephone (201) 464-1234. In Europe: 1217 Meyrin-Geneva

5952-2508

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Cardion

IFF/SIF RF TEST SET

FEATURES

- Completely solid-state design
- Frequency measurement indicated by digital display
- Power measurement for inputs up to 3500 watts
- Signal generator incorporates automatic level control circuits for all modes (CW, SWEEP, PUL)
- Variable frequency marker digitally displayed with crystal accuracy
- Internal coder with variable delay employed
- Power meter employed for calibration of signal generator output
- Single compact unit
- Modular construction

Cardion's IFF/SIF RF Test Set offers two significant features not available in other IFF/SIF RF Test Sets.

The first of these features is a frequency measurement capability, which incorporates a digital readout display. The frequency measurement is performed in two ways:

1) For CW input signals the input frequency is displayed directly with no adjustment required by the operator.
2) For pulsed inputs an internal CW voltage controlled oscillator is "zero beat" with the pulsed input by means of front panel controls. The output of the CW oscillator is read out on the display.

Additionally, internally generated RF frequencies are measured and displayed. These frequencies are: the internal signal generator output, internal variable frequency marker output, and crystal calibrator output. Input PRF in Hz also can be displayed. All of the above are individually selectable by means of a front panel DISPLAY SELECT switch.

A second feature is a VARIABLE FREQUENCY MARKER GENERATOR. This feature takes the place of crystal controlled markers. The Test Set employs a frequency measurement device so that the variable marker can be set to any frequency desired between 1010-1110 MHz with crystal accuracy and monitored continuously if desired. This results in a much more powerful tool for IFF Receiver testing than fixed crystal markers.

Other features are: automatic level control of the Internal Signal generator in all three modes of operation (CW, SWEEP, PUL), the capability of the test set to perform transmitting and receiving tests on the Interrogator without changing the set up (this is made possible by the inclusion of a SIG GEN IN port that couples the Signal Generator output to the three External Pulse Power Inputs of the demodulator); and the inclusion of an internal coder that generates either brackets or a 77 code train to allow more independent use of the RF test set.

Cardion ELECTRONICS
A UNIT OF GENERAL SIGNAL

LONG ISLAND EXPRESSWAY WOODBURY, NEW YORK 11797 TWX 510-221-2179 516 WA 1-7300

Cardion

IFF/SIF RF TEST SET

SIGNAL CHARACTERISTICS

Input/Output	Signal	Characteristics
INPUT	EXTERNAL POWER IN (1-20 mw)	Accepts CW or pulse power inputs in the range of 1 to 20 mw
INPUT	LOW POWER IN	Accepts pulse power inputs from 3.5 to 35 watts at a maximum duty cycle of 1%
INPUT	MEDIUM POWER IN	Accepts pulse power inputs from 35 to 350 watts at a maximum duty cycle of 1%
INPUT	HIGH POWER IN	Accepts pulse power inputs from 350 to 3500 watts at a maximum duty cycle of 1%
INPUT	EXTERNAL CODE/ TRIG IN	Accepts input code from Video Test Set or external triggers up to 25 volts in amplitude
OUTPUT	POWER CAL OUT DETECTED VIDEO	Provides measurement of external power inputs. Can also monitor internal Sig. Gen. by connecting SIG GEN OUT to EXTERNAL POWER IN (1-20 mw)
OUTPUT	TRANSFER OSC OUT	Provides output for "zero beating" transfer oscillator
OUTPUT	HORIZ OSCILLOSCOPE	Sawtooth waveform, synchronized to frequency sweeping of Sig. Gen.
OUTPUT	SIG GEN OUT	Output of Sig. Gen. — controlled by variable attenuator
INPUT	SIG GEN IN	When connected to SIG GEN OUT couples Sig. Gen. to HIGH POWER IN, INTERMED POWER IN, LOW POWER IN, connectors
OUT	SYNC TRIG OUT	Enables oscilloscope to be synchronized to internal coder

POWER AND SPACE REQUIREMENTS

Panel Size ..... 7" x 19" x 18" deep
Input Power ..... 120/220 V 50-400 Hz — 45 Watts
Weight ..... 40 lbs.
Operating Temperature ..... 0-50° (−28 to +65° available)
Humidity 0-70%

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BULLETIN NO. 19

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SECTION VI

ILLUSTRATED PARTS BREAKDOWN

6-1 GENERAL

This illustrated Parts Breakdown illustrates and lists the assemblies and parts necessary for support of the SSR Decoder Video Test Set. The equipment is designed and manufactured by Cardion Electronics, Woodbury, L.I., New York 11797.

6-2 ILLUSTRATIONS

Each illustration shows the location of the electrical and mechanical parts. The electrical parts are identified in accordance with MIL-STD-16; the mechanical parts have also been assigned a designation (MP).

6-3 PARTS LIST

Each assembly is listed in reference designation sequence. The parts are shown in the associated illustration and are located by the reference designation.

6-4 USABLE ON CODE

When two or more types of assemblies are listed in one list, usable on code (UOC) letters are included to indicate assembly differences. The codes used in one list have no relation to codes used in another list. The absence of a code in the column indicates that parts are common to all assemblies.

6-5 MANUFACTURERS CODE

The manufacturer's code is the five-digit code which was obtained from the Federal Supply Code for Manufacturers, Cataloging Handbook H4-1 and is provided as follows:

CODE	MANUFACTURER'S NAME AND ADDRESS
12909	Cardion Electronics Long Island Expressway Woodbury, N.Y. 11797
81349/96906	Military Specifications/Standards Pomulgated by Standardization Div. Directorate of Logistic Services DSA

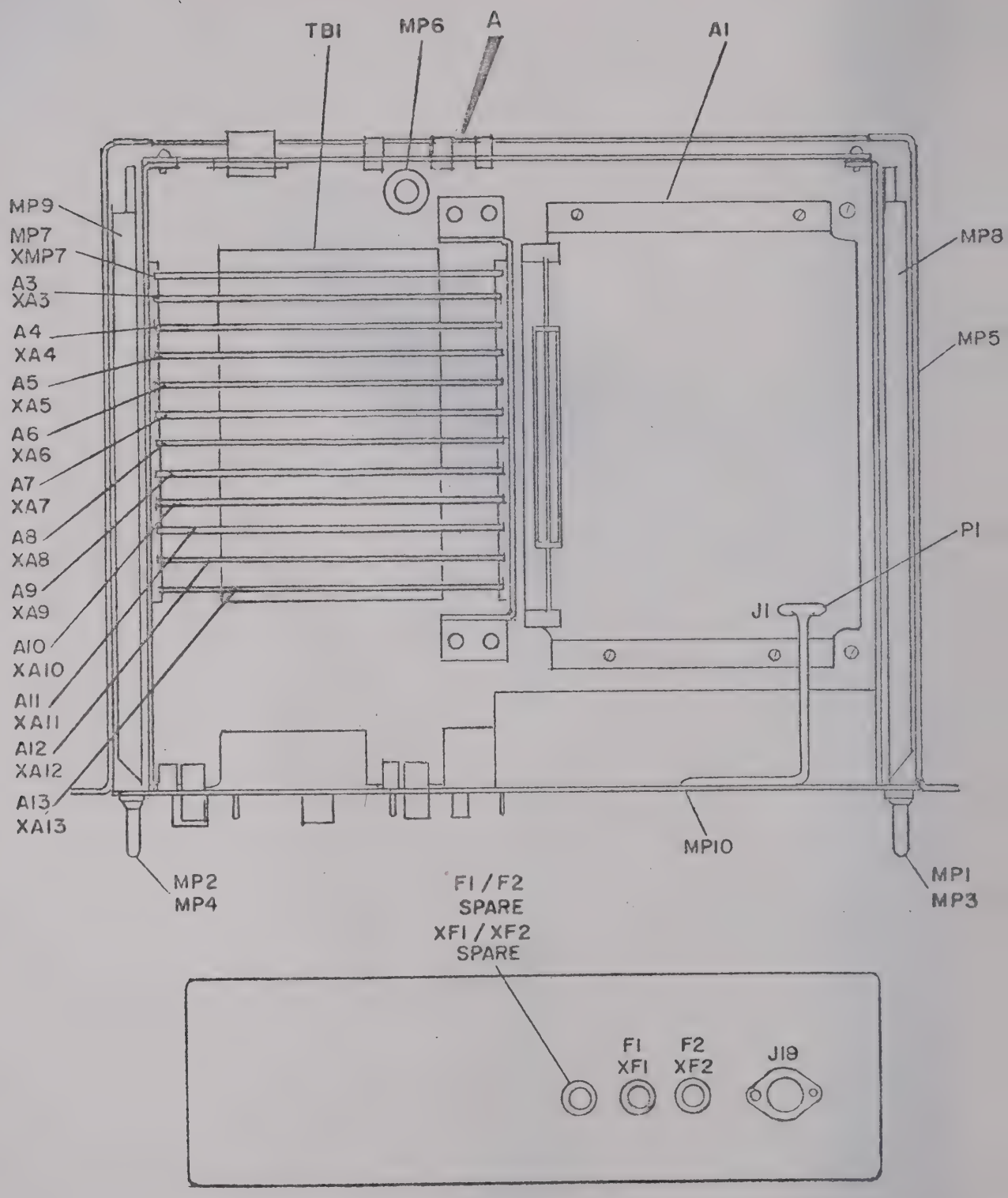

Figure 6-1. SSR Decoder Video Test Set, Unit 70, Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70	102594	12909	SSR Decoder Video Test Set (Figure 6-1)	
A1	101897G4	12909	Power Supply (Figure 6-3)	
A3	102592	12909	Azimuth Gate Generator (Figure 6-5)	
A4	101882	12909	Target 1 Code Generator Part A (Figure 6-6)	
A5	101883	12909	Target 1 Code Generator Part B (Figure 6-7)	
A6	101884G1	12909	Pulse Shaper (Figure 6-8)	
A7	101885G1	12909	Tag Generator (Figure 6-9)	
A8	102070G1	12909	Mode Gate (Figure 6-10)	
A9	101886G1	12909	Mode Select (Figure 6-11)	
A10	101887	12909	Trigger-Video (Figure 6-12)	
A11	101888	12909	Channel 2/3 Code Generator (Figure 6-13)	
A12	101889	12909	Delay (Figure 6-14)	
A13	101890	12909	Clock (Figure 6-15)	
F1, F2, Spare	F02B250V1A	81349	Fuse	
J18	402017	12909	Connector, Electrical	
MP1, MP2	MS39087-5	96906	Handle, Bow	
MP3, MP4	10270-1	12909	Ferrule	
MP5	503506	12909	Enclosure Case	
MP6	500767-3	12909	Grommet, Rubber	
MP7	101892	12909	Extender	
MP8	503509-1	12909	Bracket, Slide RH	
MP9	503509-3	12909	Bracket, Slide LH	
MP10	102595	12909	Front Panel Assembly (Figure 6-2)	
P1	M24308/2-2	81349	Connector, Electrical	
TB1	102596	12909	Connector Board	
XA3-XA13	402003	12909	Connector, Electrical	
XF1, XF2, Spare	FHN26G2	81349	Fuseholder	
XMP7	402003	12909	Connector, Electrical	

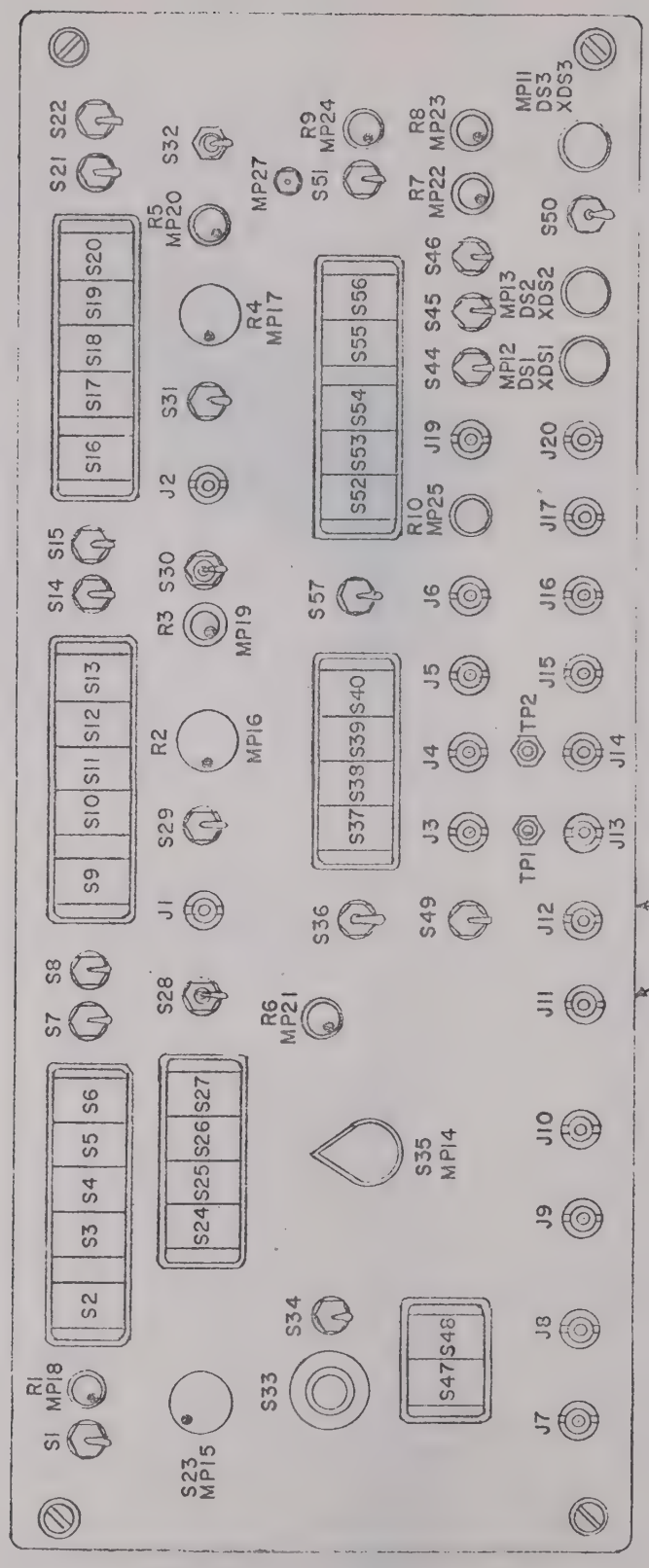

Figure 6-2. Front Panel Assembly MP10, Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
MP10	102595	12909	Front Panel Assembly (Figure 6-2)	
DS1-DS2	MS25252-C7A	96906	Lamp, neon	
DS3	MS25237-328	96906	Lamp	
J1-J17, J19,J20	M39012/21-0003	81349	Connector, Coaxial	
MP11	LC12WT2	81349	Lens	
MP12,MP13	LC13CN2	81349	Lens	
MP14	MS91528-1K2B	96906	Knob	
MP15-MP17	MS91528-1E2B	96906	Knob	
MP18-MP25	MS91528-0E1B	96906	Knob	
MP26	502312-2	12909	Terminal, Lug	
MP27	10017-2	12909	Terminal, Ground	
R1	RV6NAYSA253B	81349	Resistor, Variable	
R2	402455-1	12909	Resistor, Variable	
R3	RV6NAYSA252B	81349	Resistor, Variable	
R4	402455-1	12909	Resistor, Variable	
R5	RV6NAYSA252B	81349	Resistor, Variable	
R6	RV6NAYSA253B	81349	Resistor, Variable	
R7,R8	RV6NAYSA252B	81349	Resistor, Variable	
R9	RV6NAYSA502B	81349	Resistor, Variable	
R10	RV6NAYSA253B	81349	Resistor, Variable	
R11 ,R12	RCR07G750JS	81349	Resistor, Fixed	
S1	MS27716-23	96906	Switch, Toggle	
S2-S6	402150-1	81349	Switch, Thumbwheel	
S7-S8	MS27716-23	96906	Switch, Toggle	
S9-S13	402150-1	81349	Switch, Thumbwheel	
S14,S15	MS27716-23	96906	Switch, Toggle	
S16-S20	402150-1	81349	Switch, Thumbwheel	
S21,S22	MS27716-23	96906	Switch, Toggle	
S23	402211	81349	Switch, Rotary	
S24-S27	401999-5	81349	Switch, Thumbwheel	
S28	MS27716-21	96906	Switch, Toggle	
S29	MS27716-23	96906	Switch, Toggle	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
MP10 Continued				
S30	MS27716-21	96906	Switch, Toggle	
S31	MS27716-23	96906	Switch, Toggle	
S32	MS27716-21	96906	Switch, Toggle	
S33	MS25089-3C	96906	Switch, Push	
S34	MS27716-23	96906	Switch, Toggle	
S35	402212	12909	Switch, Rotary	
S36	MS27717-23	96906	Switch, Toggle	
S37-S40	401999-5	12909	Switch, Thumbwheel	
S44-S46	MS237716-23	96906	Switch, Toggle	
S47,S48	401999-1	12909	Switch, Thumbwheel	
S49	MS27716-23	96906	Switch, Toggle	
S50	MS27717-23	96906	Switch, Toggle	
S51	MS27716-23	96906	Switch, Toggle	
S52-S56	403317	12909	Switch, Thumbwheel	
S57	MS27717-21	96906	Switch, Toggle	
TP1, TP2	M39024/10-03	81349	Connector, Electrical	
XDS1-XDS2	LH74/1	81349	Housing, Indicator	
XDS3	LH73/1	81349	Housing, Indicator	

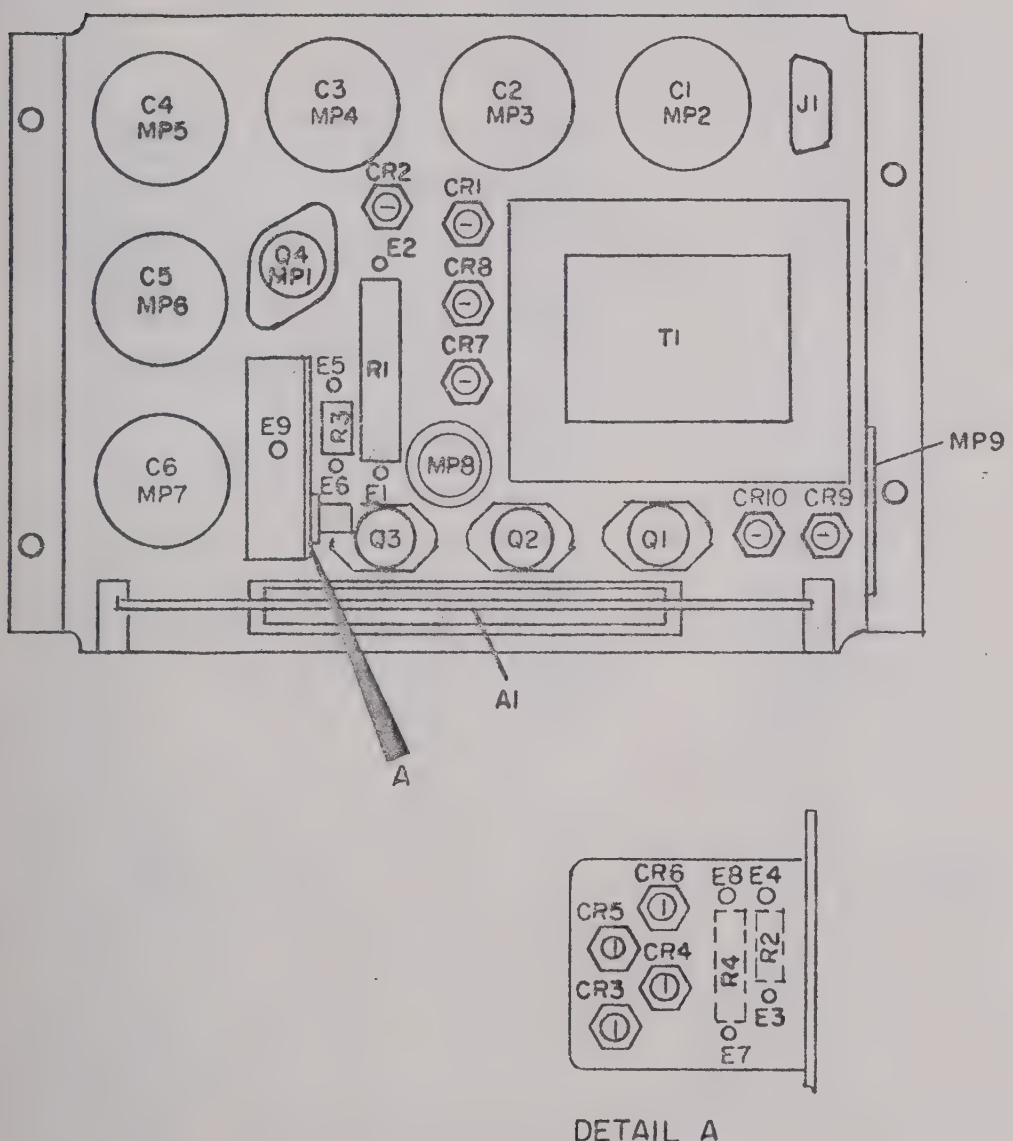

Figure 6-3. Power Supply 70A1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A1	101897G4	12909	Power Supply (Figure 6-3)	
A1	101939	12909	Power Board (Figure 6-4)	
C1,C2	CE71C113E	81349	Capacitor, Fixed	
C3	CE71C162G	81349	Capacitor, Fixed	
C4	CE71C622E	81349	Capacitor, Fixed	
C5,C6	CE71C162G	81349	Capacitor, Fixed	
CR1-CR8	1N1202A	81349	Diode	
CR9,CR10	1N2970B	81349	Diode	
E1-E8	4250-1	12909	Terminal, Standoff	
E9	502488	12909	Terminal, Lug	
MP1	10480	12909	Insulator, Transistor	
MP2-MP7	503230	12909	Clamp, Capacitor	
MP8	452	12909	Grommet, Rubber	
MP9	10434	12909	Plate, Instruction	
Q1-Q3	2N1485	81349	Transistor	
Q4	2N1490	81349	Transistor	
R1	RW68V39	81349	Resistor, Fixed	
R2	RW69V2R2	81349	Resistor, Fixed	
R3	RW69V2R7	81349	Resistor, Fixed	
R4	RW67V102	81349	Resistor, Fixed	
T1	402589	12909	Transformer	

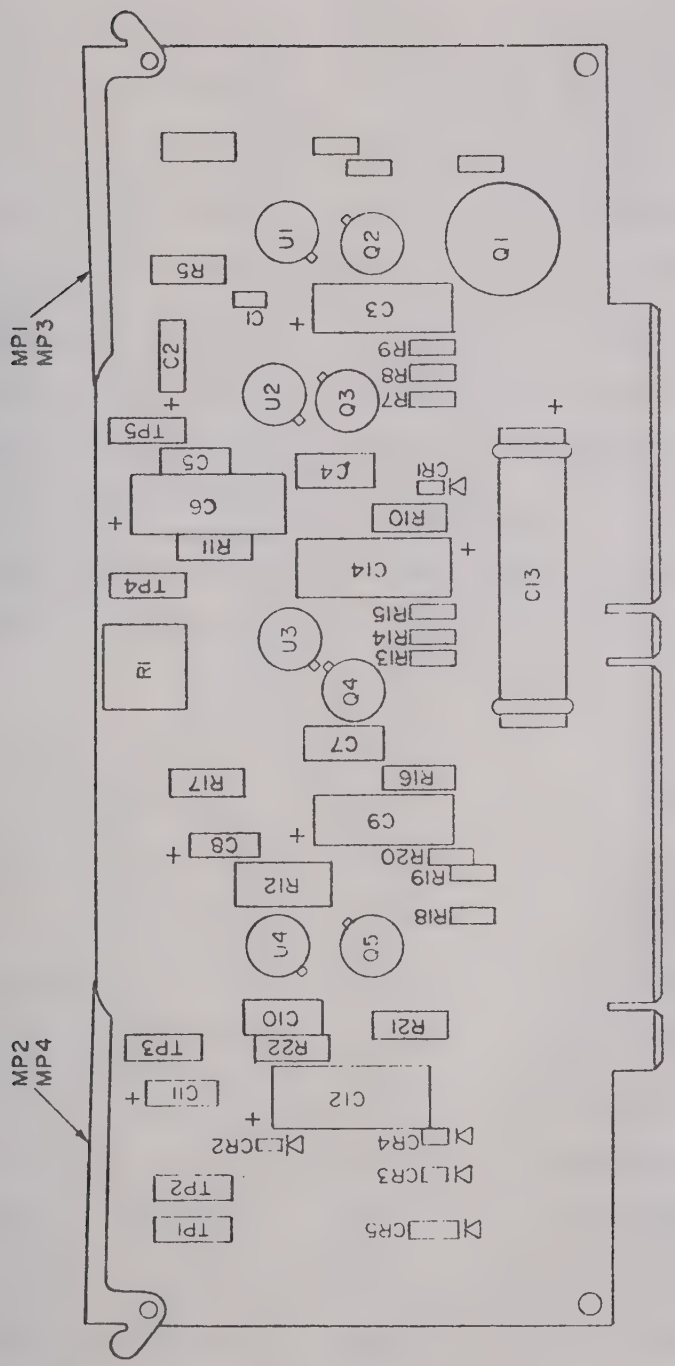

Figure 6-4. Power Board 70A1A1 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A1A1	101939	12909	Power Board (Figure 6-4)	
C1	CK05BX102M	81349	Capacitor, Fixed	
C2	M39003/01-2255	81349	Capacitor, Fixed	
C3	M39003/01-2262	81349	Capacitor, Fixed	
C4	CM05FD221J03	81349	Capacitor, Fixed	
C5	M39003/01-2255	81349	Capacitor, Fixed	
C6	M39003/01-2296	81349	Capacitor, Fixed	
C7	CK05BX102M	81349	Capacitor, Fixed	
C8	M39003/01-2255	81349	Capacitor, Fixed	
C9	M39003/01-2262	81349	Capacitor, Fixed	
C10	CM05FD221J03	81349	Capacitor, Fixed	
C11	M39003/01-2255	81349	Capacitor, Fixed	
C12	M39003/01-2296	81349	Capacitor, Fixed	
C13	M39018/01-0730	81349	Capacitor, Fixed	
C14	M39003/01-2278	81349	Capacitor, Fixed	
CR1-CR4	1N3611	81349	Diode	
CR5	1N974B	81349	Diode	
MP1, MP2	10438-1	12909	Handle, Ejector	
MP3, MP4	10439-1	12909	Rivet, Special	
MP5-MP8	401335	12909	Pad, Transistor	
Q1	2N1485	81349	Transistor	
Q2-Q5	2N2905A	81349	Transistor	
R1	RT22CP102	81349	Resistor, Variable	
R2	RCR07G221JS	81349	Resistor, Fixed	
R3	RCR07G471JS	81349	Resistor, Fixed	
R4	RCR07G182JS	81349	Resistor, Fixed	
R5	RN60D6041F	81349	Resistor, Fixed	
R6	RN60D2941F	81349	Resistor, Fixed	
R7	RCR07G101JS	81349	Resistor, Fixed	
R8	RCR07G181JS	81349	Resistor, Fixed	
R9	RCR07G182JS	81349	Resistor, Fixed	
R10	RN60D1402F	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UCC
70A1A1	Continued			
R11	RN60D2211F	81349	Resistor, Fixed	
R12	RW69V2R2	81349	Resistor, Fixed	
R13	RCR07G101JS	81349	Resistor, Fixed	
R14	RCR07G181JS	81349	Resistor, Fixed	
R15	RCR07G182JS	81349	Resistor, Fixed	
R16	RN60D6981F	81349	Resistor, Fixed	
R17	RN60D2941F	81349	Resistor, Fixed	
R18	RCR07G101JS	81349	Resistor, Fixed	
R19	RCR07G181JS	81349	Resistor, Fixed	
R20	RCR07G182JS	81349	Resistor, Fixed	
R21	RN60D1402F	81349	Resistor, Fixed	
R22	RN60D2211F	81349	Resistor, Fixed	
TP1-TP5	M39024/11-01	81349	Connector, Electrical Test Point	
U1-U4	401645	12909	Integrated Circuit	

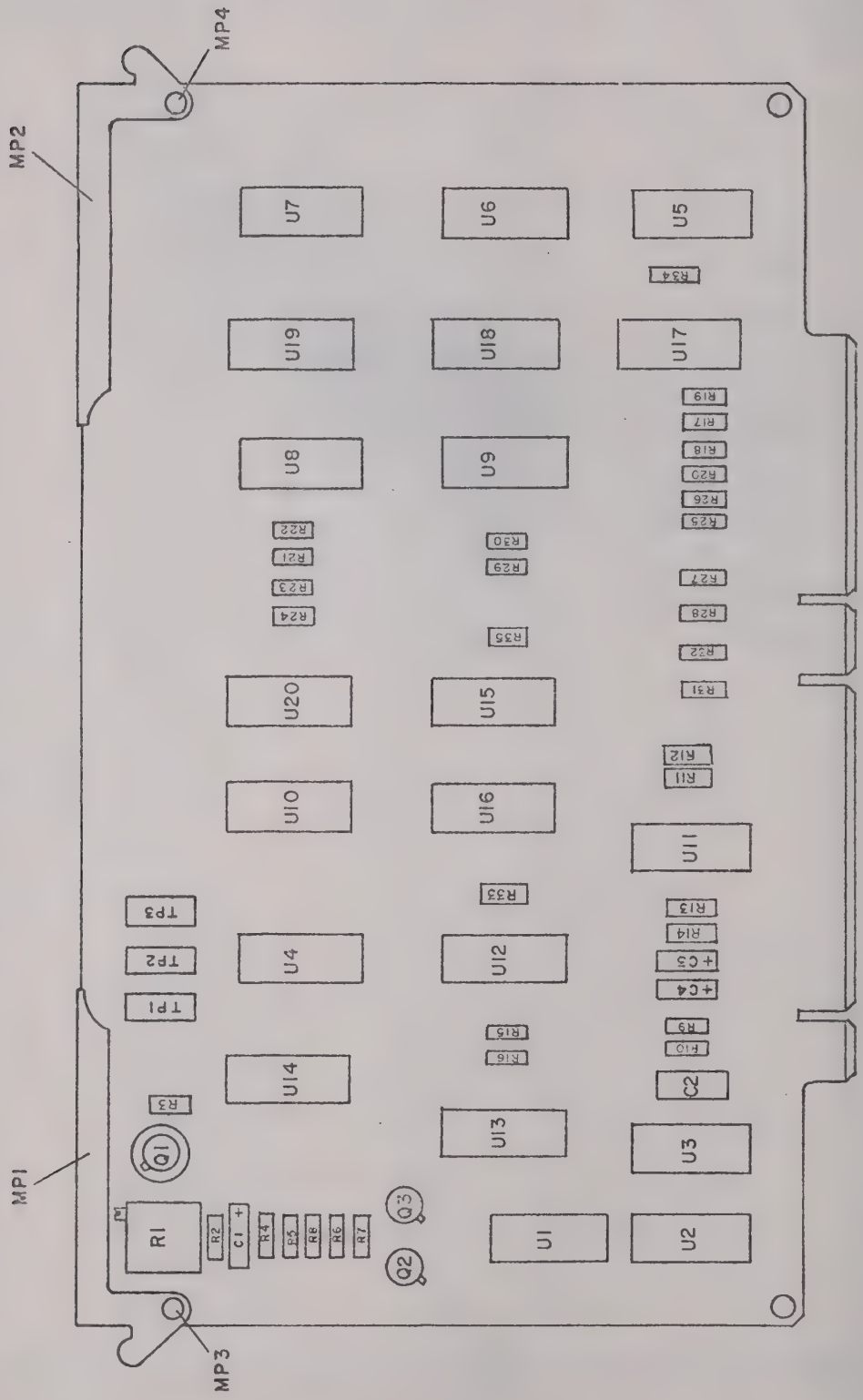

Figure 6-5. Azimuth Gate Generator 70A3, Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A3	102592	12909	Azimuth Gate Generator (Figure 6-5)	
C1	M39003/01-2341	81349	Capacitor, Fixed	
C2	CM05FD101J03	81349	Capacitor, Fixed	
C3,C4	M39003/01-2283	81349	Capacitor, Fixed	
MP1,MP2	10438-1	12909	Handle, Ejector	
MP3,MP4	10439-1	12909	Rivet, Special	
Q1	JAN2N491A	81349	Transistor	
Q2,Q3	JAN2N708	81349	Transistor	
R1	RJ22CP503	81349	Resistor, Variable	
R2	RCR07G472KS	81349	Resistor, Fixed	
R3	RCR07G331KS	81349	Resistor, Fixed	
R4	RCR07G470KS	81349	Resistor, Fixed	
R5	RCR07G102KS	81349	Resistor, Fixed	
R6,R7,R8	RCR07G222KS	81349	Resistor, Fixed	
R9,R10	RCR07G332KS	81349	Resistor, Fixed	
R11,R12	RCR07G103KS	81349	Resistor, Fixed	
R13,R14	RCR07G471KS	81349	Resistor, Fixed	
R15-R32	RCR07G103KS	81349	Resistor, Fixed	
R33	RCR07G332KS	81349	Resistor, Fixed	
R34,R35	RCR07G103KS	81349	Resistor, Fixed	
TP1,TP2, TP3	M39024/11-01	81349	Connector, Electrical Test Point	
U1,U2,U3	402275-16	12909	Integrated Circuit	
U4	402275-17	12909	Integrated Circuit	
U5-U9	402275-26	12909	Integrated Circuit	
U10	401216-9	12909	Integrated Circuit	
U11,U12	401216-1	12909	Integrated Circuit	
U13	402275-1	12909	Integrated Circuit	
U14,U15	402275-2	12909	Integrated Circuit	
U16	402275-5	12909	Integrated Circuit	
U17,U18, U19	402275-3	12909	Integrated Circuit	
U20	401216-1	12909	Integrated Circuit	

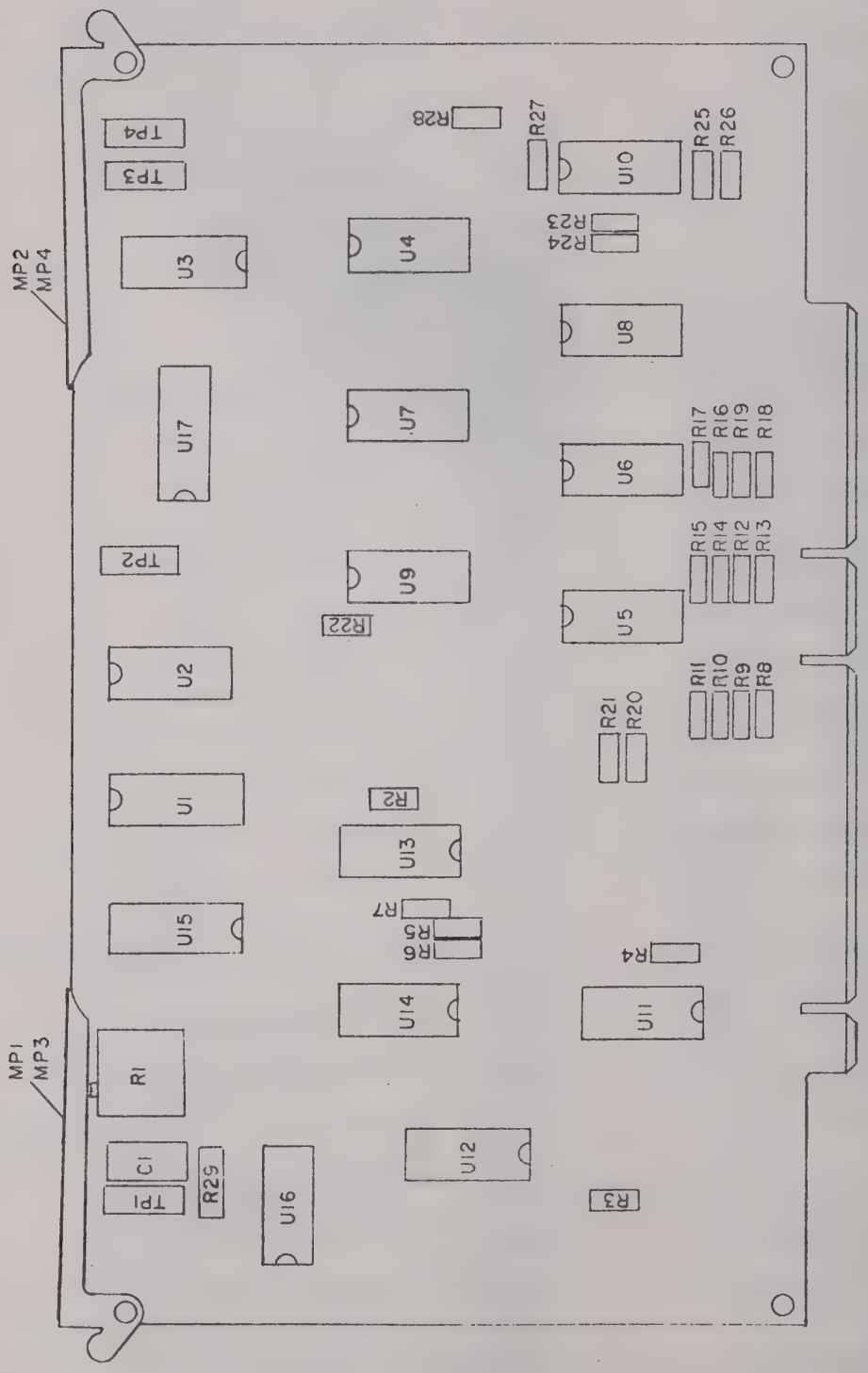

Figure 6-6. Target 1 Code Generator Part A 70A4 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A4	101882	12909	Target 1 Code Generator Part A (Figure 6-6)	
C1	CM05FD391J03	81349	Capacitor, Fixed	
MP1,MP2	10438-1	12909	Handle, Ejector	
MP3,MP4	10439-1	12909	Rivet, Special	
R1	RT22C2P502	81349	Resistor, Variable	
R2-R4	RCR07G222KS	81349	Resistor, Fixed	
R5-R21	RCR07G103KS	81349	Resistor, Fixed	
R22	RCR07G102KS	81349	Resistor, Fixed	
R23-R26	RCR07G223KS	81349	Resistor, Fixed	
R27-R28	RCR07G102KS	81349	Resistor, Fixed	
R29	RN60D2211F	81349	Resistor, Fixed	
TP1-TP4	M39024/11-01	81349	Connector, Electrical Test Point	
U1	402275-22	12909	Integrated Circuit	
U2, U3	401216-9	12909	Integrated Circuit	
U4	402275-23	12909	Integrated Circuit	
U5, U6	402275-7	12909	Integrated Circuit	
U7, U8	402275-1	12909	Integrated Circuit	
U9	402275-2	12909	Integrated Circuit	
U10	402275-3	12909	Integrated Circuit	
U11	402275-1	12909	Integrated Circuit	
U12	402275-2	12909	Integrated Circuit	
U13	402275-1	12909	Integrated Circuit	
U14	402275-2	12909	Integrated Circuit	
U15	402275-17	12909	Integrated Circuit	
U16	402275-19	12909	Integrated Circuit	
U17	402375-1	12909	Integrated Circuit	

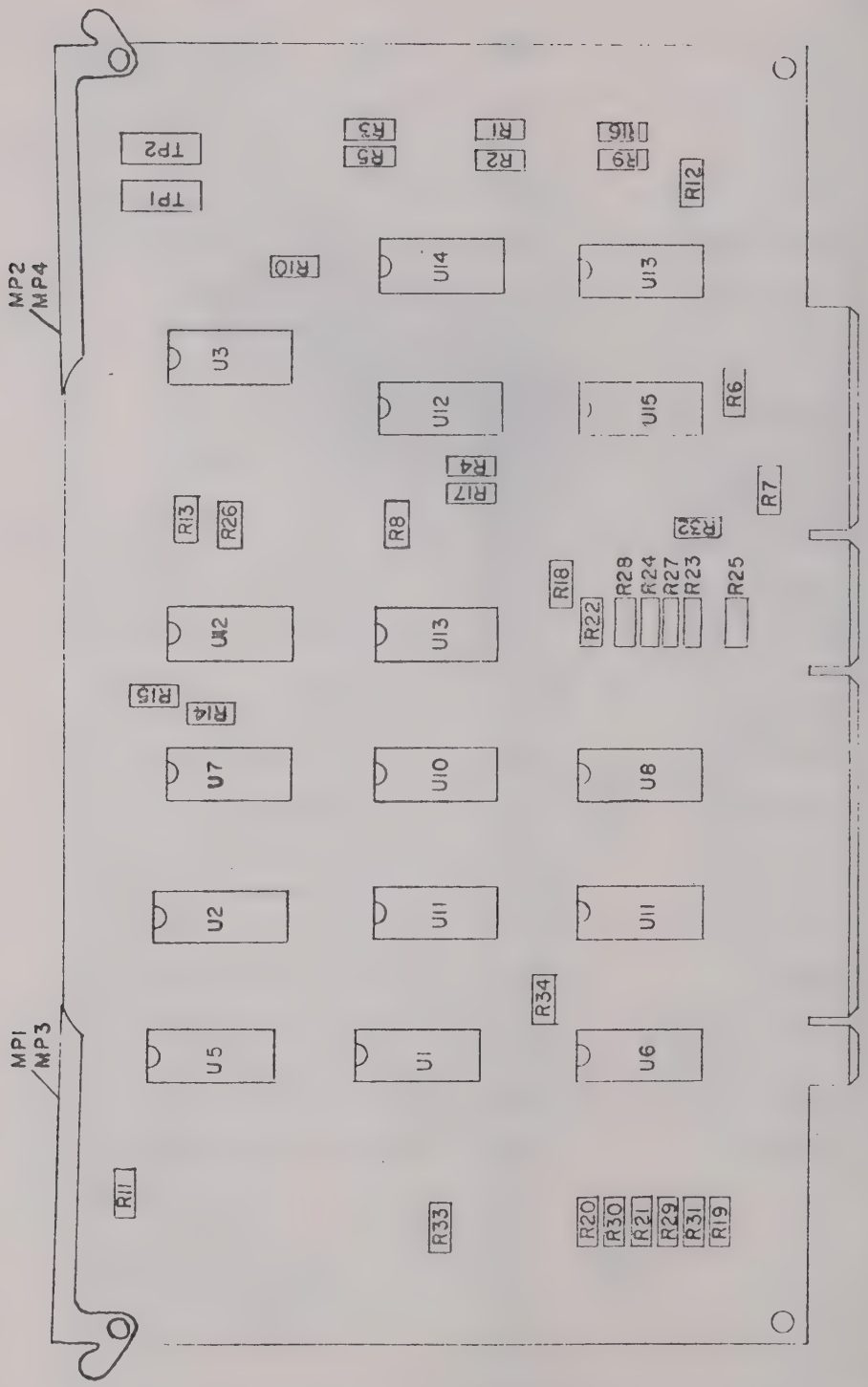

Figure 6-7. Target 1 Code Generator Part B 70A5 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A5	101883	12909	Target 1 Code Generator Part B (Figure 6-7)	
MP1,MP2	10438-1	12909	Handle, Ejector	
MP3,MP4	10439-1	12909	Rivet, Special	
R1-R4	RCR07G103KS	81349	Resistor, Fixed	
R5	RCR07G223KS	81349	Resistor, Fixed	
R6-R8	RCR07G103KS	81349	Resistor, Fixed	
R9	RCR07G223KS	81349	Resistor, Fixed	
R10,R11	RCR07G222KS	81349	Resistor, Fixed	
R12,R13	RCR07G223KS	81349	Resistor, Fixed	
R14-R17	RCR07G222KS	81349	Resistor, Fixed	
R18-R25	RCR07G223KS	81349	Resistor, Fixed	
R26	RCR07G103KS	81349	Resistor, Fixed	
R27-R31	RCR07G223KS	81349	Resistor, Fixed	
R32	RCR07G102KS	81349	Resistor, Fixed	
R33	RCR07G103KS	81349	Resistor, Fixed	
R34	RCR07G102KS	81349	Resistor, Fixed	
TP1,TP2	M39024/11-01	81349	Connector, Electrical Test Point	
U1	402275-23	12909	Integrated Circuit	
U2	402775-22	12909	Integrated Circuit	
U3-6	402775-7	12909	Integrated Circuit	
U7	401216-9	12909	Integrated Circuit	
U8	402275-7	12909	Integrated Circuit	
U9,U10	402275-1	12909	Integrated Circuit	
U11	402275-2	12909	Integrated Circuit	
U12	402275-1	12909	Integrated Circuit	
U13	401216-2	12909	Integrated Circuit	
U14	401216-1	12909	Integrated Circuit	
U15	402275-7	12909	Integrated Circuit	
U16	402275-2	12909	Integrated Circuit	

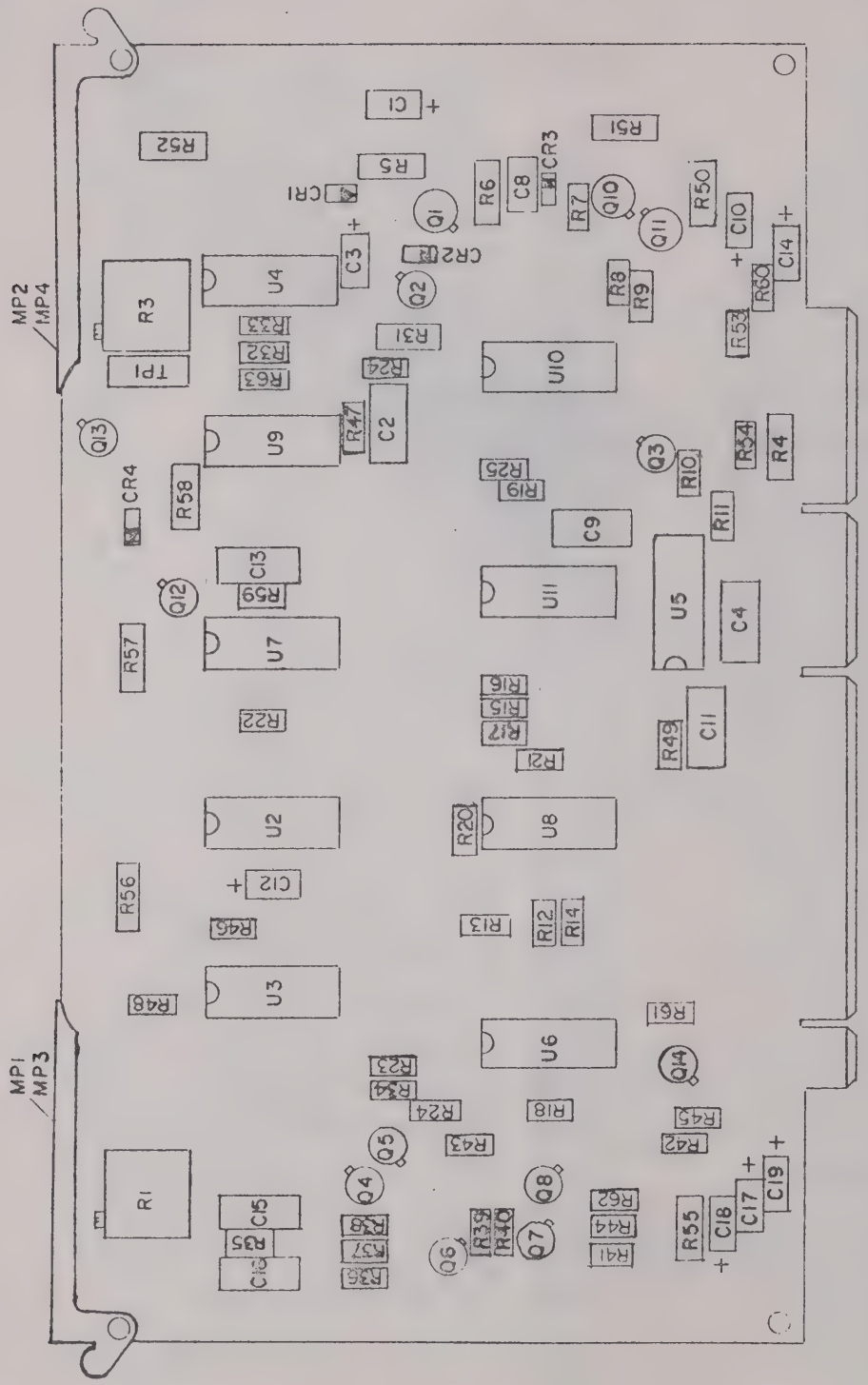

Figure 6-8. Pulse Shaper 70A6 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A6	101884G1	12909	Pulse Shaper (Figure 6-8)	
CR1-CR4	1N4148	81349	Diode	
C1	M39003/01-2284	81349	Capacitor, Fixed	
C2	CM05FD201J03	81349	Capacitor, Fixed	
C3	M39003/01-2255	81349	Capacitor, Fixed	
C4	CM05CD100J03	81349	Capacitor, Fixed	
C5-C7	Not Used			
C8	M39003/01-2284	81349	Capacitor, Fixed	
C9	CM05FD131J03	81349	Capacitor, Fixed	
C10	M39003/01-2284	81349	Capacitor, Fixed	
C11	CM05CD100J03	81349	Capacitor, Fixed	
C12	M39003/01-2284	81349	Capacitor, Fixed	
C13	CM05CD150J03	81349	Capacitor, Fixed	
C14	M39003/01-2284	81349	Capacitor, Fixed	
C15	CM05FD201J03	81349	Capacitor, Fixed	
C16	CM05ED680J03	81349	Capacitor, Fixed	
C17,C18	M39003/01-2284	81349	Capacitor, Fixed	
C19	M39003/01-2255	81349	Capacitor, Fixed	
MP1, MP2	10438-1	12909	Handle, Ejector	
MP3, MP4	10439-1	12909	Rivet, Special	
Q1	2N3251A	81349	Transistor	
Q2-Q4	2N708	81349	Transistor	
Q5	2N3251A	81349	Transistor	
Q6-Q8	2N2222A	81349	Transistor	
Q9	Not Used			
Q10	2N3251A	81349	Transistor	
Q11	2N708	81349	Transistor	
Q12	2N3251A	81349	Transistor	
Q13.Q14	2N708	81349	Transistor	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A6 Continued				
R1	RT22C2P203	81349	Resistor, Variable	
R2	Not Used			
R3	RT22C2P502	81349	Resistor, Variable	
R4	RCR07G471JS	81349	Resistor, Fixed	
R5	RN60D1001F	81349	Resistor, Fixed	
R6	RN60D4021F	81349	Resistor, Fixed	
R7	RCR07G222KS	81349	Resistor, Fixed	
R8	RCR07G682KS	81349	Resistor, Fixed	
R9	RCR07G153KS	81349	Resistor, Fixed	
R10	RCR07G222KS	81349	Resistor, Fixed	
R11,R12	RCR07G103KS	81349	Resistor, Fixed	
R13	RCR07G223KS	81349	Resistor, Fixed	
R14	RCR07G103KS	81349	Resistor, Fixed	
R15-R17	RCR07G222KS	81349	Resistor, Fixed	
R18-R22	RCR07G103KS	81349	Resistor, Fixed	
R23	RCR07G223KS	81349	Resistor, Fixed	
R24,R25	RCR07G222KS	81349	Resistor, Fixed	
R26-R30	Not used			
R31	RCR20G101KS	81349	Resistor, Fixed	
R32	RCR07G102KS	81349	Resistor, Fixed	
R33	RCR07G222KS	81349	Resistor, Fixed	
R34-R36	RCR07G102KS	81349	Resistor, Fixed	
R37	RCR07G123K5	81349	Resistor, Fixed	
R38	RCR07G102KS	81349	Resistor, Fixed	
R39	RCR07G222KS	81349	Resistor, Fixed	
R40	RCR07G102KS	81349	Resistor, Fixed	
R41	RCR07G332KS	81349	Resistor, Fixed	
R42	RCR07G100KS	81349	Resistor, Fixed	
R43	RCR07G102KS	81349	Resistor, Fixed	
R44	RCR07G332KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A6 Continued				
R45	RCR07G100KS	81349	Resistor, Fixed	
R46	RCR07G102KS	81349	Resistor, Fixed	
R47-R49	RCR07G103KS	81349	Resistor, Fixed	
R50,R51	RN60D1001F	81349	Resistor, Fixed	
R52	RN60D2741F	81349	Resistor, Fixed	
R53	RCR07G102KS	81349	Resistor, Fixed	
R54	RCR07G682KS	81349	Resistor, Fixed	
R55	RN60D4751F	81349	Resistor, Fixed	
R56-R58	RN60D1001F	81349	Resistor, Fixed	
R59	RCR07G222KS	81349	Resistor, Fixed	
R60	RCR07G102KS	81349	Resistor, Fixed	
R61	RCR07G103KS	81349	Resistor, Fixed	
R62	RCR07G682KS	81349	Resistor, Fixed	
R63	RCR07G223KS	81349	Resistor, Fixed	
TP1	M39024/11-01	81349	Connector, Electrical Test Point	
U1	Not used	12909	Integrated Circuit	
U2, U3	402275-7	12909	Integrated Circuit	
U4	402275-3	12909	Integrated Circuit	
U5	402275-20	12909	Integrated Circuit	
U6, U7	402275-1	12909	Integrated Circuit	
U8-U10	402275-3	12909	Integrated Circuit	
U11	402275-1	12909	Integrated Circuit	

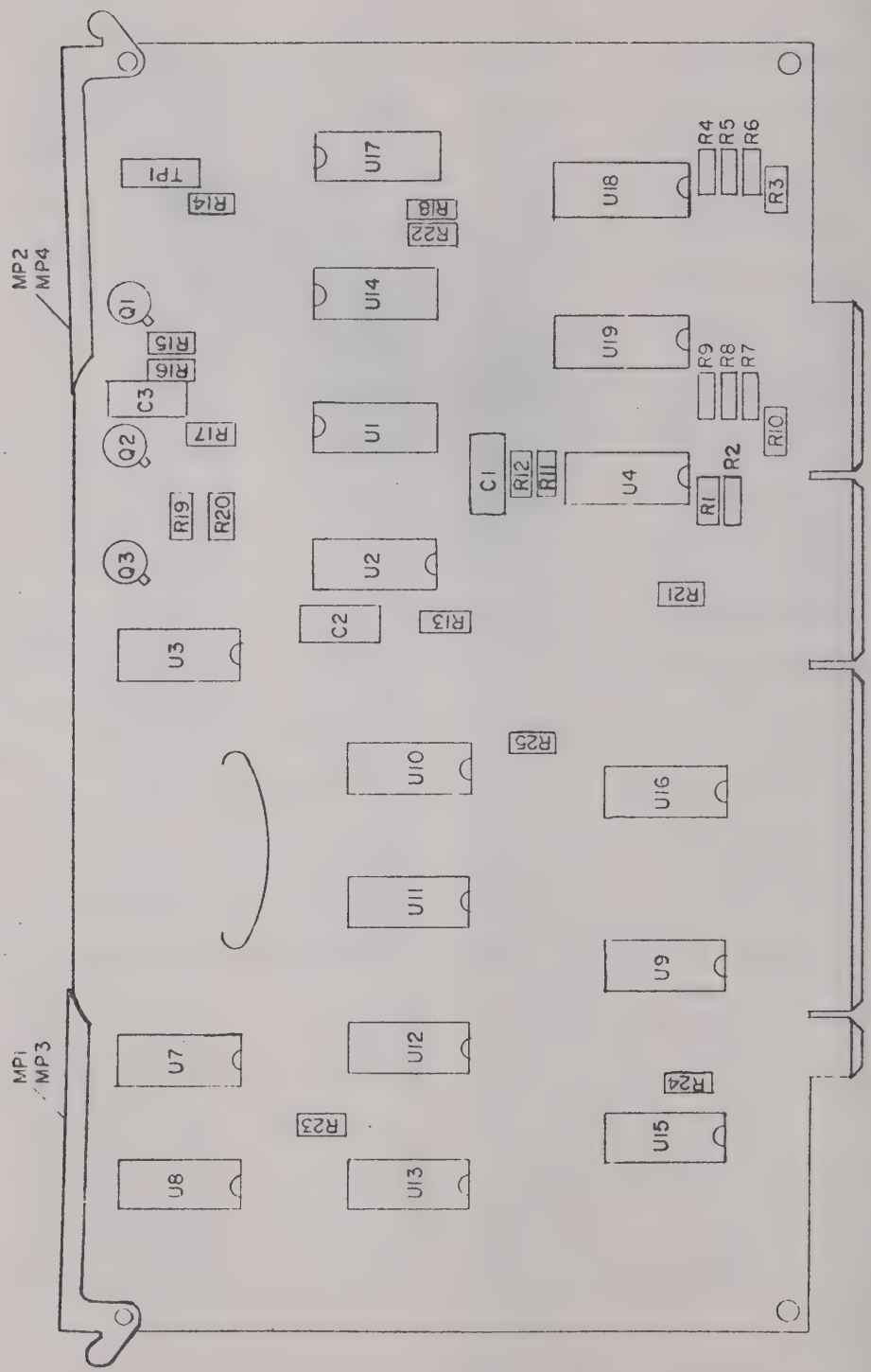

Figure 6-9. Tag Generator 70A7 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A7	101885G1	12909	Tag Generator (Figure 6-9)	
C1, C2	CM05FD391J03	81349	Capacitor, Fixed	
C3	CM05ED680J03	81349	Capacitor, Fixed	
MP1,MP2	10438-1	12909	Handle, Ejector	
MP3,MP4	10439-1	12909	Rivet, Special	
Q1	2N708	81349	Transistor	
Q2	2N3251A	81349	Transistor	
Q3	2N2222A	81349	Transistor	
R1, R2	RCR07G103KS	81349	Resistor, Fixed	
R3-R10	RCR07G223KS	81349	Resistor, Fixed	
R11	RCR07G472KS	81349	Resistor, Fixed	
R12	RCR07G682KS	81349	Resistor, Fixed	
R13	RCR07G393KS	81349	Resistor, Fixed	
R14, R15	RCR07G102KS	81349	Resistor, Fixed	
R16	RCR07G123KS	81349	Resistor, Fixed	
R17	RCR07G222KS	81349	Resistor, Fixed	
R18	RCR07G103KS	81349	Resistor, Fixed	
R19	RCR07G102KS	81349	Resistor, Fixed	
R20	RCR07G332KS	81349	Resistor, Fixed	
R21	RCR07G100KS	81349	Resistor, Fixed	
R22	RCR07G222KS	81349	Resistor, Fixed	
R23-R25	RCR07G102KS	81349	Resistor, Fixed	
TP1	M39024/11-01	81349	Connector, Electrical Test Point	
U1	402275-29	12909	Integrated Circuit	
U2	402275-19	12909	Integrated Circuit	
U3, U4	401216-9	12909	Integrated Circuit	
U5, U6	Not used			
U7, U8	402275-23	12909	Integrated Circuit	
U9	402275-29	12909	Integrated Circuit	
U10-U14	402275-1	12909	Integrated Circuit	
U15	401216-2	12909	Integrated Circuit	
U16	402275-10	12909	Integrated Circuit	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A7	Continued			
U17	401216-1	12909	Integrated Circuit	
U18,U19	402375-1	12909	Integrated Circuit	

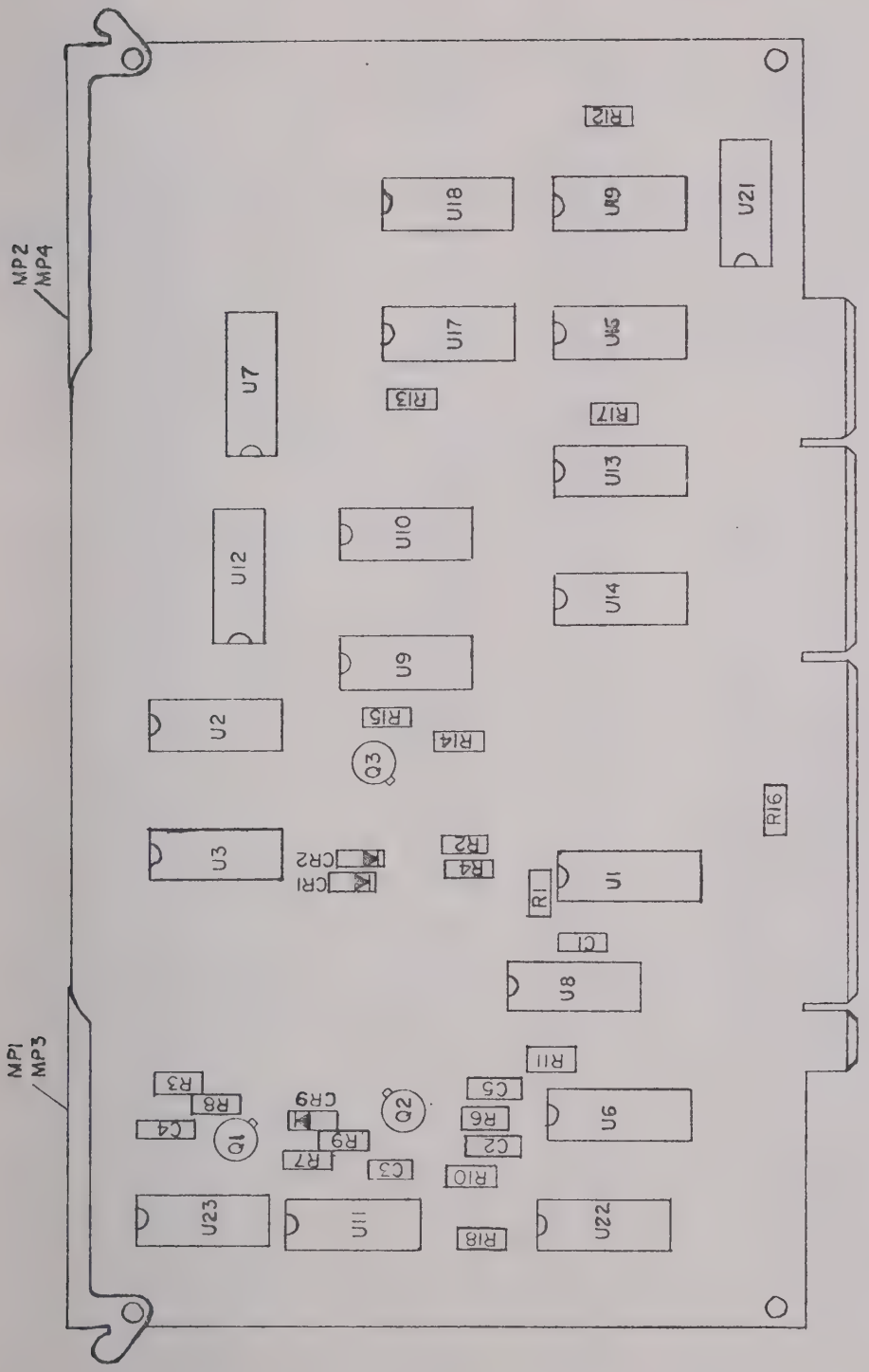

Figure 6-10. Mode Gate 70A8 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A8	102070G1	12909	Mode Gate (Figure 6-10)	
CR1, CR2	1N4148	81349	Diode	
CR3-CR8	Not Used			
CR9	1N4148	81349	Diode	
C1	CK06BX222M	81349	Capacitor, Fixed	
C2	CM05FD201J03	81349	Capacitor, Fixed	
C3	CK06BX103M	81349	Capacitor, Fixed	
C4	CM05ED680J03	81349	Capacitor, Fixed	
C5	CM05FD201J03	81349	Capacitor, Fixed	
MP1, MP2	10438-1	12909	Handle, Ejector	
MP3, MP4	10439-1	12909	Rivet, Special	
Q1-Q3	2N2222A	81349	Transistor	
R1	RCR07G273KS	81349	Resistor, Fixed	
R2-R5	RCR07G682KS	81349	Resistor, Fixed	
R6	RCR07G332KS	81349	Resistor, Fixed	
R7	RCR07G393KS	81349	Resistor, Fixed	
R8	RCR07G103KS	81349	Resistor, Fixed	
R9	RCR07G332KS	81349	Resistor, Fixed	
R10	RCR07G222KS	81349	Resistor, Fixed	
R11	RCR07G332KS	81349	Resistor, Fixed	
R12	RCR07G222KS	81349	Resistor, Fixed	
R13	RCR07G103KS	81349	Resistor, Fixed	
R14, R15	RCR07G102KS	81349	Resistor, Fixed	
R16-R18	RCR07G222KS	81349	Resistor, Fixed	
U1	402275-36	81349	Integrated Circuit	
U2, U3	402275-23	81349	Integrated Circuit	
U6	402275-20	81349	Integrated Circuit	
U7	402275-24	81349	Integrated Circuit	
U8	402275-19	12909	Integrated Circuit	
U9, U10	401216-9	12909	Integrated Circuit	
U11	402275-3	12909	Integrated Circuit	
U12	401216-3	12909	Integrated Circuit	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A8 Continued				
U13, 14	402275-30	12909	Integrated Circuit	
U16-U19	401216-1	12909	Integrated Circuit	
U20	Not used			
U21	402275-38	12909	Integrated Circuit	
U22, U23	401216-1	12909	Integrated Circuit	

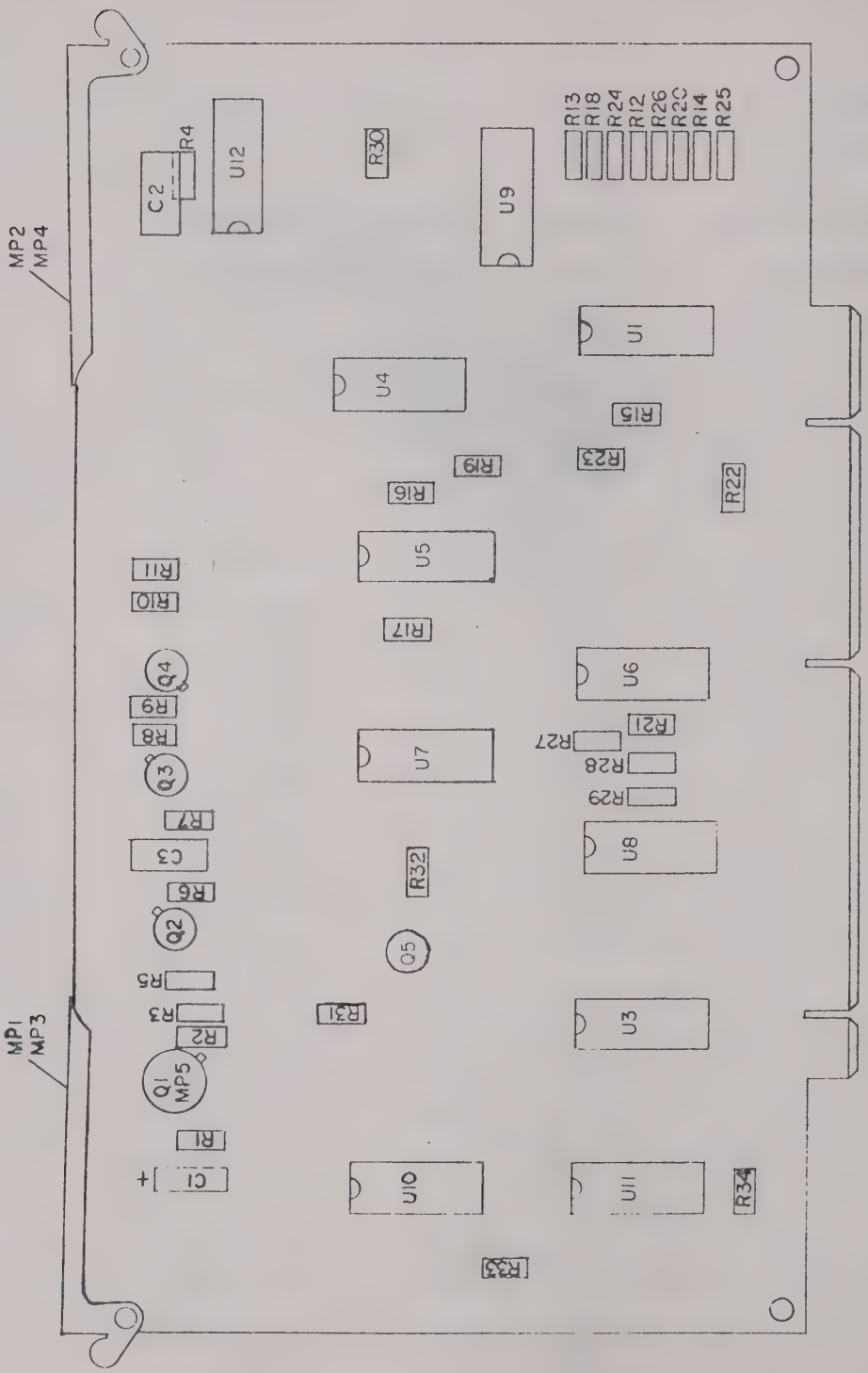

Figure 6-11. Mode Select 70A9 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A9	101886G1	12909	Mode Select (Figure 6-11)	
C1	M39003/01-2345	81349	Capacitor, Fixed	
C2	CM05ED391J03	81349	Capacitor, Fixed	
C3	CM05ED680J03	81349	Capacitor, Fixed	
MP1, MP2	10438-1	12909	Handle, Ejector	
MP3, MP4	10439-1	12909	Rivet, Special	
MP5	401335	12909	Pad, Transistor	
Q1	2N491A	81349	Transistor	
Q2	2N708	81349	Transistor	
Q3	2N3251A	81349	Transistor	
Q4	2N2222A	81349	Transistor	
Q5	2N708	81349	Transistor	
R1	RCR07G472KS	81349	Resistor, Fixed	
R2	RCR07G331KS	81349	Resistor, Fixed	
R3	RCR07G470KS	81349	Resistor, Fixed	
R4	RCR07G333KS	81349	Resistor, Fixed	
R5, R6	RCR07G102KS	81349	Resistor, Fixed	
R7	RCR07G123KS	81349	Resistor, Fixed	
R8	RCR07G222KS	81349	Resistor, Fixed	
R9	RCR07G102KS	81349	Resistor, Fixed	
R10	RCR07G332KS	81349	Resistor, Fixed	
R11	RCR07G100KS	81349	Resistor, Fixed	
R12-R29	RCR07G103KS	81349	Resistor, Fixed	
R30-R34	RCR07G222KS	81349	Resistor, Fixed	
U1	401216-3	12909	Integrated Circuit	
U2	Not used			
U3	402275-2	12909	Integrated Circuit	
U4-U8	401216-2	12909	Integrated Circuit	
U9-U11	402275-3	12909	Integrated Circuit	
U12	402275-19	12909	Integrated Circuit	

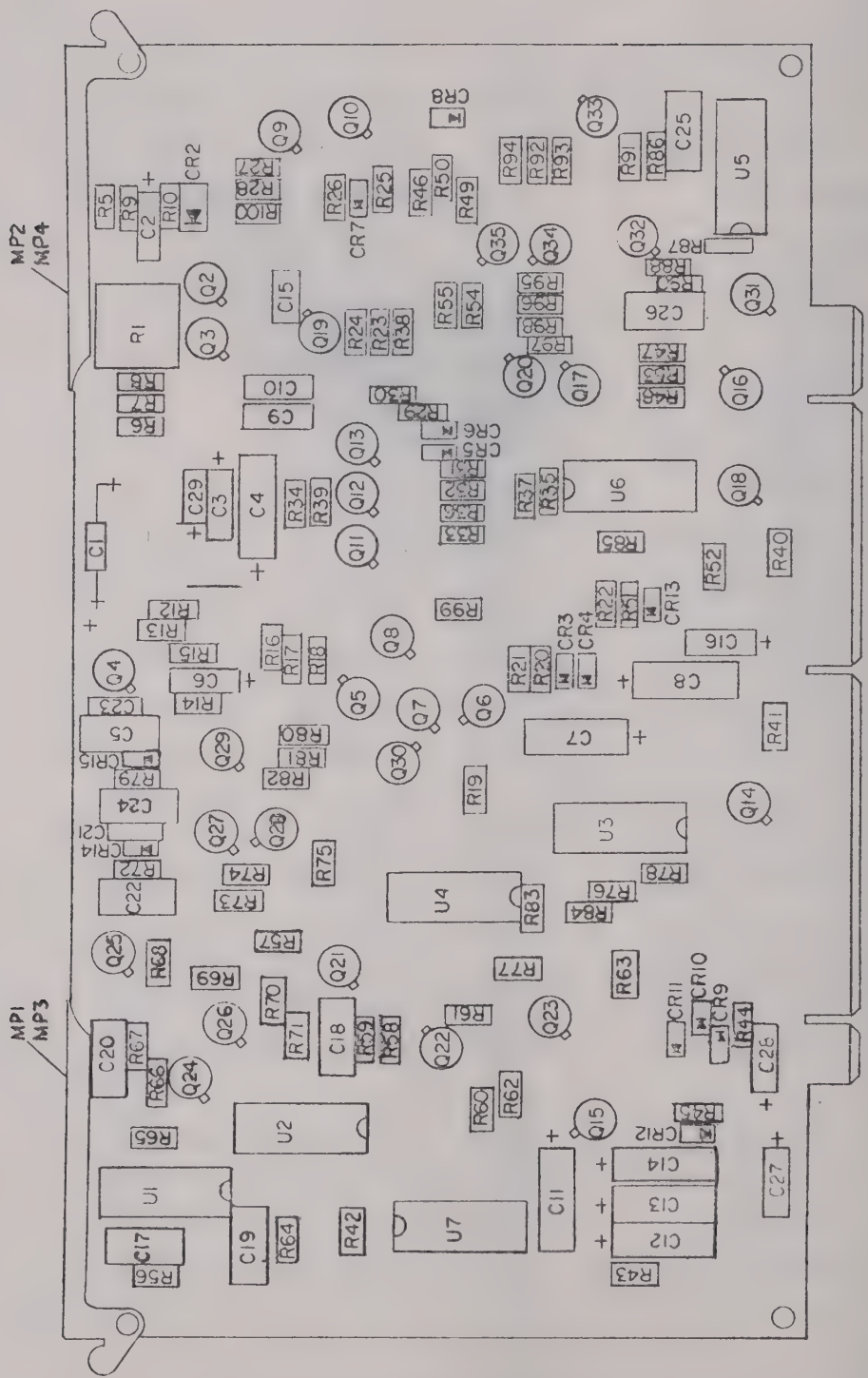

Figure 6-12. Trigger-Video 70A10 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A10	101887	12909	Trigger-Video (Figure 6-12)	
C1-C3	M39003/01-2284	81349	Capacitor, Fixed	
C4	M39003/01-2290	81349	Capacitor, Fixed	
C5	CK06BX103M	81349	Capacitor, Fixed	
C6	M39003/01-2284	81349	Capacitor, Fixed	
C7	M39003/01-2290	81349	Capacitor, Fixed	
C8	M39003/01-2259	81349	Capacitor, Fixed	
C9, C10	M39003/01-2284	81349	Capacitor, Fixed	
C11	M39003/01-2290	81349	Capacitor, Fixed	
C12-C14	M39003/01-2259	81349	Capacitor, Fixed	
C15	CK60AW102M	81349	Capacitor, Fixed	
C16	M39003/01-2284	81349	Capacitor, Fixed	
C17	CM05FD391J03	81349	Capacitor, Fixed	
C18	CM05ED680J03	81349	Capacitor, Fixed	
C19	CM05FD391J03	81349	Capacitor, Fixed	
C20	CM05ED680J03	81349	Capacitor, Fixed	
C21	CK06BX103M	81349	Capacitor, Fixed	
C22	CM05ED680J03	81349	Capacitor, Fixed	
C23	CK06BX103M	81349	Capacitor, Fixed	
C24	CM05ED680J03	81349	Capacitor, Fixed	
C25	CM05FD391J03	81349	Capacitor, Fixed	
C26	CK05ED680J03	81349	Capacitor, Fixed	
C27-C29	M39003/01-2284	81349	Capacitor, Fixed	
CR1	Not Used			
CR2	JAN1N756A	81349	Diode	
CR3-CR15	1N4148	81349	Diode	
MP1, MP2	10438-1	12909	Handle, Ejector	
MP3, MP4	10439-1	12909	Rivet, Special	
Q1	Not Used			
Q2-Q4	2N2222A	81349	Transistor	
Q5	2N3251A	81349	Transistor	
Q6	2N2222A	81349	Transistor	
Q7	2N3251A	81349	Transistor	
Q8	2N708	81349	Transistor	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A10 Continued				
Q9-Q18	2N2222A	81349	Transistor	
Q19	2N708	81349	Transistor	
Q20	2N2222A	81349	Transistor	
Q21	2N708	81349	Transistor	
Q22	2N3251A	81349	Transistor	
Q23	2N2222A	81349	Transistor	
Q24	2N708	81349	Transistor	
Q25	2N3251A	81349	Transistor	
Q26, Q27	2N2222A	81349	Transistor	
Q28	2N708	81349	Transistor	
Q29	2N2222A	81349	Transistor	
Q30, Q31	2N708	81349	Transistor	
Q32	2N3251A	81349	Transistor	
Q33-Q35	2N2222A	81349	Transistor	
R1	RT22C2P102	81349	Resistor, Variable	
R2	Not Used			
R3	Not Used			
R4	Not Used			
R5	RCR07G102KS	81349	Resistor, Fixed	
R6	RCR07G102KS	81349	Resistor, Fixed	
R7, R8	RCR07G332KS	81349	Resistor, Fixed	
R9	RCR07G103KS	81349	Resistor, Fixed	
R10	RCR07G473KS	81349	Resistor, Fixed	
R11	Not Used			
R12	RCR07G473KS	81349	Resistor, Fixed	
R13	RCR07G682KS	81349	Resistor, Fixed	
R14	RCR07G182KS	81349	Resistor, Fixed	
R15	RT22C2P102	81349	Resistor, Variable	
R16	RCR07G682KS	81349	Resistor, Fixed	
R17	RCR07G473KS	81349	Resistor, Fixed	
R18	RCR07G332KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A10	Continued			
R19	RCR07G222KS	81349	Resistor, Fixed	
R20	RCR07G183KS	81349	Resistor, Fixed	
R21	RCR07G101KS	81349	Resistor, Fixed	
R22	RCR07G222KS	81349	Resistor, Fixed	
R23	RCR07G332KS	81349	Resistor, Fixed	
R24,R25	RCR07G103KS	81349	Resistor, Fixed	
R26	RCR07G332KS	81349	Resistor, Fixed	
R27	RCR07G332KS	81349	Resistor, Fixed	
R28	RCR07G100KS	81349	Resistor, Fixed	
R29,R30	RCR07G222KS	81349	Resistor, Fixed	
R31,R32	RCR07G332KS	81349	Resistor, Fixed	
R33,R34	RCR07G331KS	81349	Resistor, Fixed	
R35-R37	RCR07G332KS	81349	Resistor, Fixed	
R38	RCR07G331KS	81349	Resistor, Fixed	
R39	RCR07G332KS	81349	Resistor, Fixed	
R40	RCR07G100KS	81349	Resistor, Fixed	
R41	RCR07G331KS	81349	Resistor, Fixed	
R42	RCR07G332KS	81349	Resistor, Fixed	
R43	RCR07G102KS	81349	Resistor, Fixed	
R44	RCR07G183KS	81349	Resistor, Fixed	
R45	RCR07G472KS	81349	Resistor, Fixed	
R46	RCR07G332KS	81349	Resistor, Fixed	
R47	RCR07G472KS	81349	Resistor, Fixed	
R48	RCR07G332KS	81349	Resistor, Fixed	
R49	RCR07G332KS	81349	Resistor, Fixed	
R50	RCR07G100KS	81349	Resistor, Fixed	
R51	RCR07G223KS	81349	Resistor, Fixed	
R52	RCR07G331KS	81349	Resistor, Fixed	
R53	RCR07G332KS	81349	Resistor, Fixed	
R54	RCR07G332KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A10	Continued			
R55	RCR07G100KS	81349	Resistor, Fixed	
R56	RCR07G393KS	81349	Resistor, Fixed	
R57,R58	RCR07G332KS	81349	Resistor, Fixed	
R59	RCR07G123KS	81349	Resistor, Fixed	
R60	RCR07G222KS	81349	Resistor, Fixed	
R61,R62	RCR07G332KS	81349	Resistor, Fixed	
R63	RCR07G100KS	81349	Resistor, Fixed	
R64	RCR07G393KS	81349	Resistor, Fixed	
R65-R66	RCR07G332KS	81349	Resistor, Fixed	
R67	RCR07G123KS	81349	Resistor, Fixed	
R68	RCR07G222KS	81349	Resistor, Fixed	
R69,R70	RCR07G332KS	81349	Resistor, Fixed	
R71	RCR07G100KS	81349	Resistor, Fixed	
R72	RCR07G393KS	81349	Resistor, Fixed	
R73	RCR07G103KS	81349	Resistor, Fixed	
R74	RCR07G332KS	81349	Resistor, Fixed	
R75	RCR07G222KS	81349	Resistor, Fixed	
R76	RCR07G103KS	81349	Resistor, Fixed	
R77,R78	RCR07G222KS	81349	Resistor, Fixed	
R79	RCR07G393KS	81349	Resistor, Fixed	
R80	RCR07G103KS	81349	Resistor, Fixed	
R81	RCR07G332KS	81349	Resistor, Fixed	
R82	RCR07G222KS	81349	Resistor, Fixed	
R83-R85	RCR07G103KS	81349	Resistor, Fixed	
R86	RCR07G393KS	81349	Resistor, Fixed	
R87,R88	RCR07G332KS	81349	Resistor, Fixed	
R89	Not used			

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A10 Continued				
R90	RCR07G123KS	81349	Resistor, Fixed	
R91, R92	RCR07G222KS	81349	Resistor, Fixed	
R93-R95	RCR07G332KS	81349	Resistor, Fixed	
R96	RCR07G100KS	81349	Resistor, Fixed	
R97	RCR07G332KS	81349	Resistor, Fixed	
R98	RCR07G100KS	81349	Resistor, Fixed	
R99	RCR07G471KS	81349	Resistor, Fixed	
R100	RCR07G220KS	81349	Resistor, Fixed	
U1,U2	402275-19	12909	Integrated Circuit	
U3	401216-2	12909	Integrated Circuit	
U4	402275-1	12909	Integrated Circuit	
U5	402275-19	12909	Integrated Circuit	
U6	402275-3	12909	Integrated Circuit	
U7	402275-6	12909	Integrated Circuit	

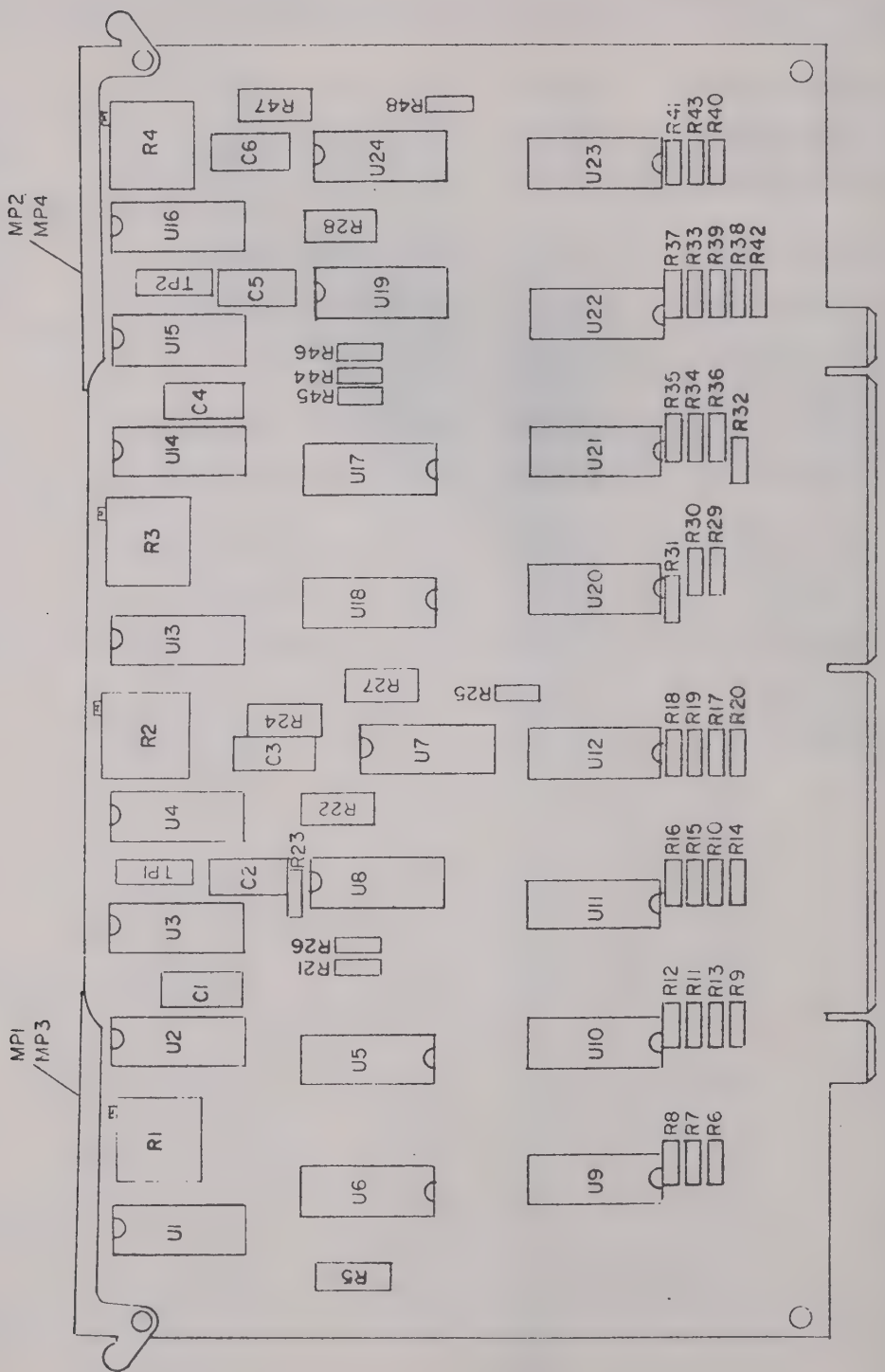

Figure 6-13. Target 2/3 Code Generator 70A11 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A11	101888	12909	Target 2/3 Code Generator (Figure 6-13)	
C1,C2	CM05ED820J03	81349	Capacitor, Fixed	
C3	CM05FD121J03	81349	Capacitor, Fixed	
C4,C5	CM05ED820J03	81349	Capacitor, Fixed	
C6	CM05FD121J03	81349	Capacitor, Fixed	
MP1,MP2	10438-1	12909	Handle, Ejector	
MP3,MP4	10439-1	12909	Rivet, Special	
R1	RT22C2P103	81349	Resistor, Variable	
R2	RT22C2P502	81349	Resistor, Variable	
R3	RT22C2P103	81349	Resistor, Variable	
R4	RT22C2P502	81349	Resistor, Variable	
R5	RN60D4751F	81349	Resistor, Fixed	
R6-R21	RCR07G223KS	81349	Resistor, Fixed	
R22	RN60D1002F	81349	Resistor, Fixed	
R23	RCR07G222KS	81349	Resistor, Fixed	
R24	RN60D2211F	81349	Resistor, Fixed	
R25	RCR07G102KS	81349	Resistor, Fixed	
R26	RCR07G223KS	81349	Resistor, Fixed	
R27	RN60D4751F	81349	Resistor, Fixed	
R28	RN60D1002F	81349	Resistor, Fixed	
R29-R44	RCR07G223KS	81349	Resistor, Fixed	
R45	RCR07G222KS	81349	Resistor, Fixed	
R46	RCR07G223KS	81349	Resistor, Fixed	
R47	RN60D2211F	81349	Resistor, Fixed	
R48	RCR07G102KS	81349	Resistor, Fixed	
TP1,TP2	M39024/11-01	81349	Connector, Electrical Test Point	
U1	401216-9	12909	Integrated Circuit	
U2-U3	402275-19	12909	Integrated Circuit	
U4	401216-9	12909	Integrated Circuit	
U5-U6	402275-23	12909	Integrated Circuit	
U7	402275-19	12909	Integrated Circuit	
U8	402275-7	12909	Integrated Circuit	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A11 Continued				
U9-U12	402275-1	12909	Integrated Circuit	
U13	401216-9	12909	Integrated Circuit	
U14-U15	402275-19	12909	Integrated Circuit	
U16	401216-9	12909	Integrated Circuit	
U17-U18	402275-23	12909	Integrated Circuit	
U19	402275-7	12909	Integrated Circuit	
U20-U23	402275-1	12909	Integrated Circuit	
U24	402275-19	12909	Integrated Circuit	

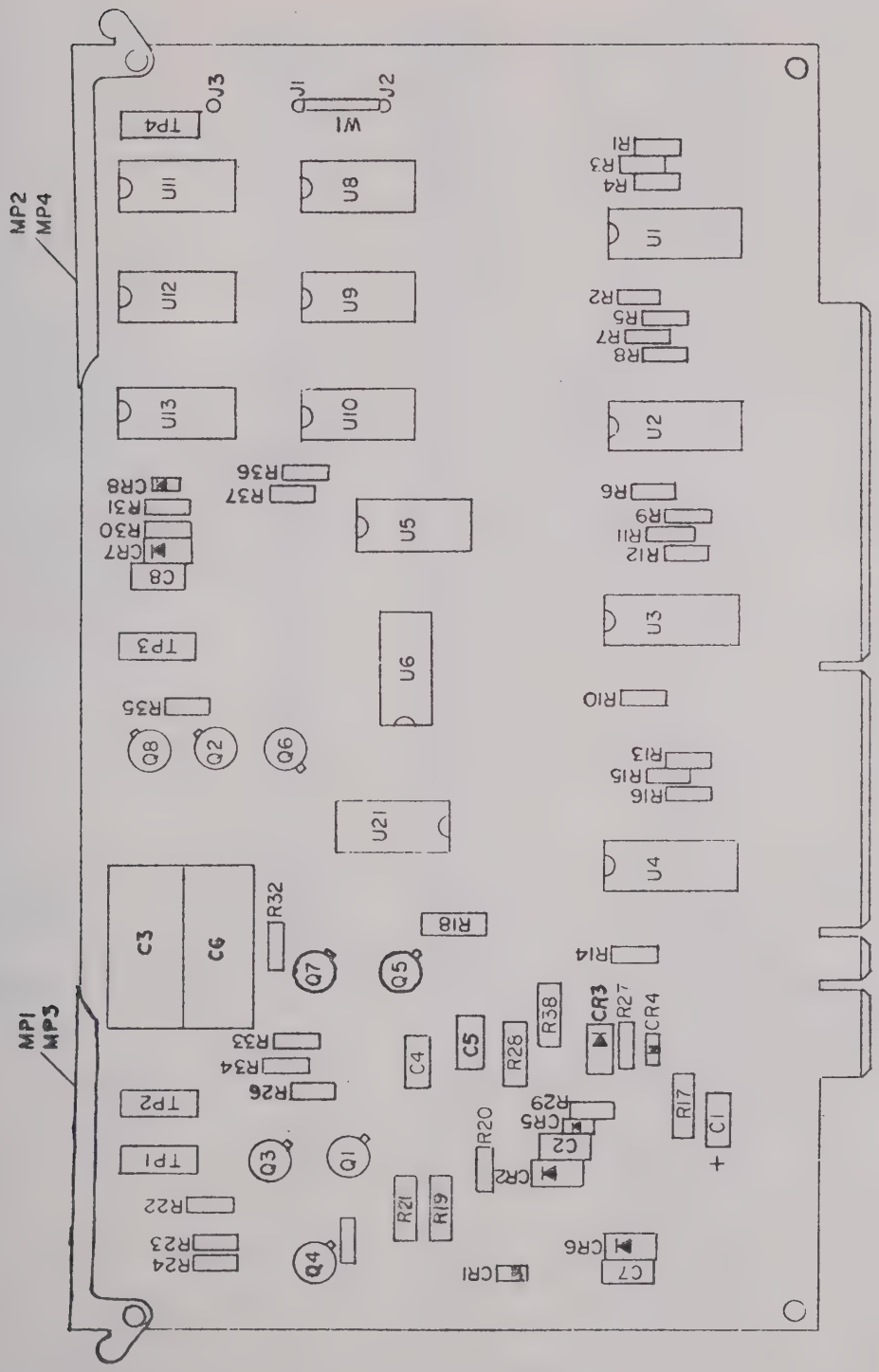

Figure 6-14. Delay 70A12 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A12	101889	12909	Delay (Figure 6-14)	
CR1	1N4148	81349	Diode	
CR2	1N757A	81349	Diode	
CR3	1N751A	81349	Diode	
CR4, CR5	1N4148	81349	Diode	
CR6	1N757A	81349	Diode	
CR7	1N751A	81349	Diode	
CR8	1N4148	81349	Diode	
C1, C2	M39003/01-2284	81349	Capacitor, Fixed	
C3	CQ09A1PA223G3	81349	Capacitor, Fixed	
C4	M39003/01-2255	81349	Capacitor, Fixed	
C5	M39003/01-2284	81349	Capacitor, Fixed	
C6	CQ09A1PA223G3	81349	Capacitor, Fixed	
C7	M39003/01-2284	81349	Capacitor, Fixed	
C8	M39003/01-2255	81349	Capacitor, Fixed	
J1-J3	401700	12909	Jack, Low Silhouette	
MP1, MP2	10438-1	12909	Handle, Ejector	
MP3, MP4	10439-1	12909	Rivet, Special	
Q1	2N3251A	81349	Transistor	
Q2	2N222A	81349	Transistor	
Q3, Q4	2N708	81349	Transistor	
Q5	2N3251A	81349	Transistor	
Q6	2N222A	81349	Transistor	
Q7, Q8	2N708	81349	Transistor	
R1-R16	RCR07G223KS	81349	Resistor	
R17,R18	RN60D2211F	81349	Resistor, Fixed	
R19	RN60D9090F	81349	Resistor, Fixed	
R20	RCR07G471KS	81349	Resistor, Fixed	
R21	RN60D1821F	81349	Resistor, Fixed	
R22	RCR07G222KS	81349	Resistor, Fixed	
R23	RCR07G682KS	81349	Resistor, Fixed	
R24	RCR07G153KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A12	Continued			
R25	RCR07G222KS	81349	Resistor, Fixed	
R26	RCR07G472KS	81349	Resistor, Fixed	
R27	RCR07G222KS	81349	Resistor, Fixed	
R28	RN60D9090F	81349	Resistor, Fixed	
R29	RCR07G471KS	81349	Resistor, Fixed	
R30	RCR07G472KS	81349	Resistor, Fixed	
R31	RCR07G222KS	81349	Resistor, Fixed	
R32	RCR07G682KS	81349	Resistor, Fixed	
R33	RCR07G222KS	81349	Resistor, Fixed	
R34	RCR07G153KS	81349	Resistor, Fixed	
R35	RCR07G222KS	81349	Resistor, Fixed	
R36	RCR07G222KS	81349	Resistor, Fixed	
R37	RCR07G222KS	81349	Resistor, Fixed	
R38	RN60D1821F	81349	Resistor, Fixed	
TP1-TP4	M39024/11-01	81349	Connector, Electrical Test Point	
U1-U4	402275-26	12909	Integrated Circuit	
U5	401216-5	12909	Integrated Circuit	
U6	402275-2	12909	Integrated Circuit	
U7-U8	401216-9	12909	Integrated Circuit	
U9	401216-1	12909	Integrated Circuit	
U10	402275-3	12909	Integrated Circuit	
U11-U13	402275-23	12909	Integrated Circuit	
W1	401699	12909	Link, Terminal Connecting	

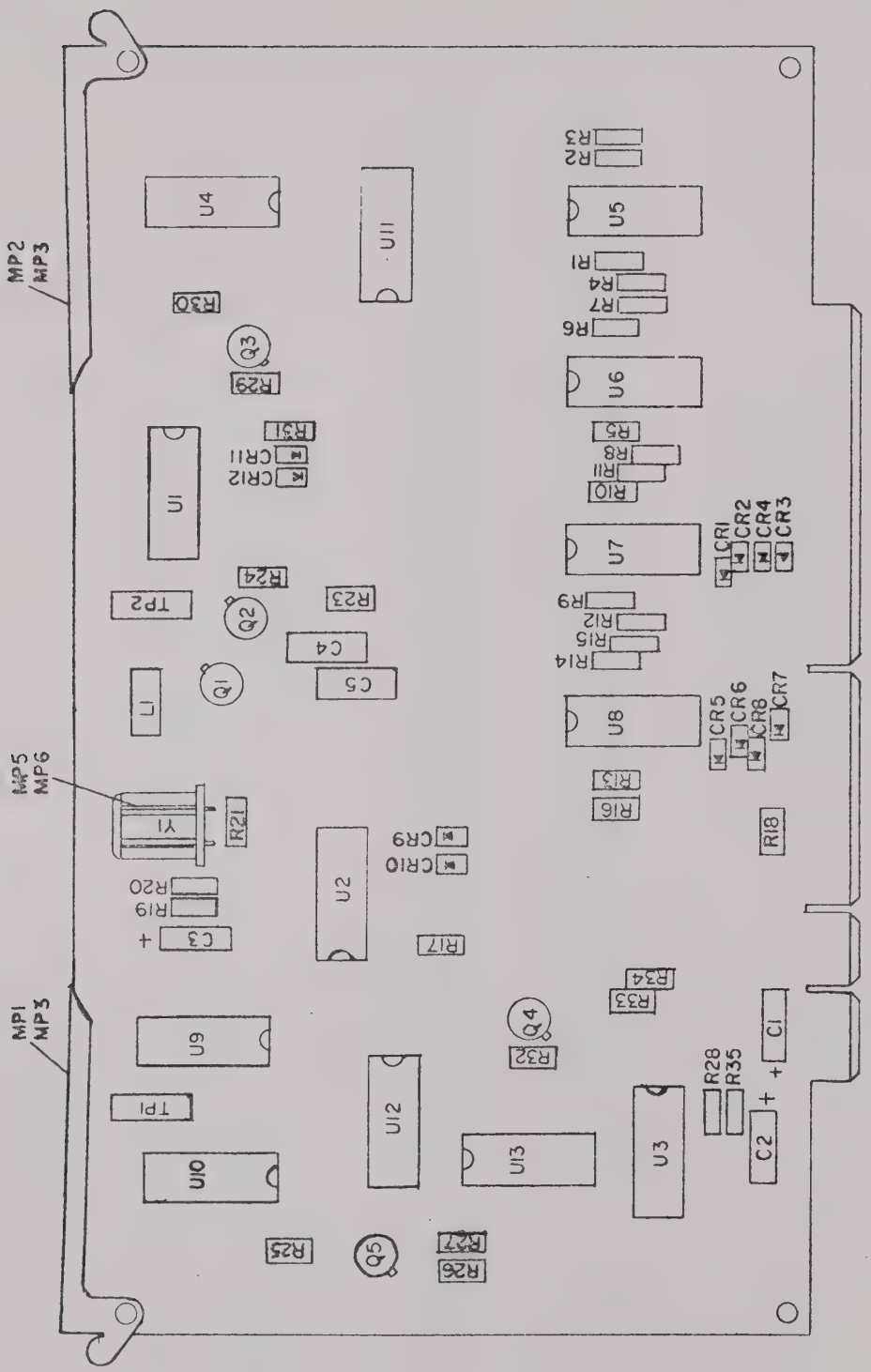

Figure 6-15. Clock 70A13 Parts Location

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A13	101890	12909	Clock (Figure 6-15)	
CR1-CR12	1N4148	81349	Diode	
C1, C2	M39003/01-2284	81349	Capacitor, Fixed	
C3	M39003/01-2255	81349	Capacitor, Fixed	
C4	CM05FD181J03	81349	Capacitor, Fixed	
C5	CM05CD150J03	81349	Capacitor, Fixed	
L1	MS14046-1	96906	Coil, Fixed	
MP1, MP2	10438-1	12909	Handle, Ejector	
MP3, MP4	10439-1	12909	Rivet, Special	
MP5	503235	12909	Clip, Spring, Tension	
MP6	10484-3	12909	Eyelet, Rolled Flange	
Q1-Q3	2N708	81349	Transistor	
Q4-Q5	2N2222A	81349	Transistor	
R1-R16	RCR07GF223KS	81349	Resistor, Fixed	
R17	RCR07GF103KS	81349	Resistor, Fixed	
R18	RCR07GF682KS	81349	Resistor, Fixed	
R19	RCR07GF101KS	81349	Resistor, Fixed	
R20-R21	RCR07GF562KS	81349	Resistor, Fixed	
R22	Not used			
R23	RCR07GF102KS	81349	Resistor, Fixed	
R24	RCR07GF181KS	81349	Resistor, Fixed	
R25	RCR07GF102KS	81349	Resistor, Fixed	
R26	RCR07GF392KS	81349	Resistor, Fixed	
R27	RCR07G100KS	81349	Resistor, Fixed	
R28	RCR07GF102KS	81349	Resistor, Fixed	
R29	RCR07GF222KS	81349	Resistor, Fixed	
R30	RCR07GF102KS	81349	Resistor, Fixed	
R31	RCR07GF682KS	81349	Resistor, Fixed	
R32	RCR07GF102KS	81349	Resistor, Fixed	
R33	RCR07GF392KS	81349	Resistor, Fixed	
R34	RCR07G100KS	81349	Resistor, Fixed	
R35	RCR07GF102KS	81349	Resistor, Fixed	

REF DES	PART NUMBER	MFR	DESCRIPTION	UOC
70A13 Continued				
TP1, TP2	M39024/11-01	81349	Connector, Electrical Test Point	
U1	402275-17	12909	Integrated Circuit	
U2	401216-1	12909	Integrated Circuit	
U3	402275-1	12909	Integrated Circuit	
U4	402275-32	12909	Integrated Circuit	
U5-U8	402375-1	12909	Integrated Circuit	
U9	402275-32	12909	Integrated Circuit	
U10	402275-22	12909	Integrated Circuit	
U11	402275-29	12909	Integrated Circuit	
U12	402275-17	12909	Integrated Circuit	
U13	402275-28	12909	Integrated Circuit	
Y1	CR64/U, 11.0344 MHz	81349	Crystal Unit, Quartz	

H. RF CALIBRATION TEST SET

1. General

This subsection provides the information on installation and operation of the RF Calibration Test Set, hereafter referred to as the CRF.

2. Functional

The CRF is an all solid-state test set that when operating in conjunction with the SIF Pulse Train Generator, provides simulation of either an interrogator set and/or a transponder for testing the RF portion of a Basic Mark 10 or Mark 10 IFF system.

The CRF contains an RF Signal Generator that generates L-band pulses that are variable in frequency (from 1005 to 1115 MHz) and amplitude (from 0 to -100 dBm). The Signal Generator can be modulated externally by an SIF code train, and in addition can be operated in Sweep and CW modes. A Marker Generator is employed for use in the Sweep mode. The marker frequency can be varied from 1005 to 1115 MHz.

The CRF provides Frequency Measuring Circuits that utilize crystal references to measure CW or pulsed frequencies in the range of 1005 to 1115 MHz.

The CRF has the capability of measuring pulse powers of from 3.5 watts to 3500 watts peak and up to 15 watts average. Low CW power of from 1 to 20 milliwatts can also be measured.

Special features include a frequency "lockout" circuit that "zeroizes the display when frequencies below 1000 MHz or above 1120 MHz are present. Additionally, internally generated RF frequencies are measured and displayed. These frequencies are the internal signal generator output, internal variable frequency marker output and crystal calibrator output. Input PRF in Hz can also be displayed. All of the above are individually selectable by means of a front panel DISPLAY SELECT switch. All the above frequencies are measured with crystal accuracy.

3. Description of Unit

The CRF may be rack or platform mounted. The chassis can be extended on slides for servicing. All operating controls and test connectors are located on the front panel. The power connector and line fuses are located on the rear panel. The blown-fuse indicators are located on the front panel.

The CRF consists of a power supply module, three plug-in printed-circuit card assemblies, a LO/VCO module, a counter/prescaler module, signal generator module, marker generator module, broad band detector assembly, preselector/mixer assembly, and a broad band coupler assembly.

The LO/VCO module contains five terminal printed-circuit boards. The counter/preselector module contains one terminal printed-circuit board.

The signal generator module contains four subassemblies which include one plug-in printed-circuit card and four terminal printed-circuit cards. The marker generator module consists of two assemblies which include three terminal printed-circuit boards.

The broad band detector, preselector/mixer and broad band coupler are stripline devices, each of which contain two terminal printed-circuit boards (a conductor pattern board and a mating board).

The plug-in printed-circuit cards are provided with extractor lifts to facilitate removal. All alignment and test points are accessible without extending the cards. However, an extender card is provided for further troubleshooting.

The CRF is supplied to provide test capabilities on Modes 1, 2, 3/A, B, C and D only. The unit can be modified to provide a Mode 4 capability by changing to a high average power load for power measurements.

4. Reference Data

Reference data for the CRF is given in Table 11.

Table 11. Reference Data for the RF Calibration Test Set

ITEM	CHARACTERISTIC	CAPABILITIES AND LIMITATIONS
Input Power	Line voltage	220 or 115 VAC ± 10%
SIG GEN IN	RF level	+20 to -100 dBm
	Pulse width	0.35 to 1.0 μs
	Risetime	50 to 100 μs
	Falltime	50 to 150 μs
	Coupling to high power input	47 ± 2 dB
	Coupling to medium power input	37 ± 2 dB
	Coupling to low power input	27 ± 2 dB
EXTERNAL POWER IN (1-20 mW)	RF level	0 to 13 dBm (calibrated in CW mode)
	Pulse width	0.35 to 1.0 μs
	Risetime	50 to 100 μs
	Falltime	50 to 150 μs
LOW POWER IN	Power level	3.5 to 35 watts peak, 0.5 watts avg.
	Pulse width	0.35 to 1.0 μs
	Risetime	50 to 100 μs
	Falltime	50 to 150 μs

Table 11. Reference Data for the RF Calibration Test Set (Cont'd)

ITEM	CHARACTERISTIC	CAPABILITIES AND LIMITATIONS
MEDIUM POWER IN	Power level	35 to 350 watts, 1.5 watts average
	Pulse width	0.35 to 1.0 μs
	Risetime	50 to 100 μs
	Falltime	50 to 150 μs
HIGH POWER IN	Power level	350 to 3500 watts peak, 15 watts avg.
	Pulse width	0.35 to 1.0 μs
	Risetime	50 to 100 μs
	Falltime	50 to 150 μs
EXTERNAL CODE/ TRIG IN	Amplitude	2 to 4 volts
	Pulse width	0.35 to 1.0 μs
	Risetime	50 to 100 μs
	Falltime	50 to 100 μs
	PRF	100 to 10,000 Hz
	Polarity	Positive

Table 11. Reference Data for the RF Calibration Test Set (Cont'd)

ITEM	CHARACTERISTIC	CAPABILITIES AND LIMITATIONS
POWER CAL OUT DETECTED VIDEO	Pulse mode - amplitude	Greater than 100 MV when terminated in 75 ohms and 3 external pulse power inputs are within their specified limits
	Distribution	Less than 5% overshoot; less than 2% degradation in rise and falltimes
	Calibration accuracy	±1 dB maximum (terminated in 75 ohms)
	Frequency response	1010-1110 MHz
	Polarity	Positive
	CW mode	
	Amplitude	Greater than 100 MV when unterminated and external power input)1-20 μs) is within its specified limits
	Calibration accuracy	±1 dB maximum (unterminated)
	Frequency response	1010-1110 MHz
	Polarity	Positive

Table 11. Reference Data for the RF Calibration Test Set (Cont'd)

ITEM	CHARACTERISTIC	CAPABILITIES AND LIMITATIONS
SYNC TRIGGER OUT	Amplitude	5 ± 0.5 volt
	Polarity	Positive
	Pulse width	1.0 ± 0.3 μs
	Risetime	≤ 50 ns
	Falltime	≤ 150 ns
	PRF	500 ± 0.1 Hz
HORIZONTAL OSCILLOSCOPE OUTPUT	Amplitude	Ramp -4 ± 1 volt to 9 ± 2 volts Baseline 10.5 ± 1 volt
	Linearity	≤ 2% from 5% to 100% point on ramp 1.8 to 1 by adjustment of sawtooth amp potentiometer
VERTICAL OSCILLOSCOPE OUTPUT	Amplitude	From 0.1 to +6 volts peak-to-peak minimum by adjustment of MARKER AMP potentiometer
	Width	Less than 100 kHz at 90% amplitude point

Table 11. Reference Data for the RF Calibration Test Set (Cont'd)

ITEM	CHARACTERISTIC	CAPABILITIES AND LIMITATIONS
TRANSFER OSCILLATOR OUT	Amplitude	volts peak-to-peak (when zero beat is achieved and EXTERNAL PULSE POWER INPUTS are in range)
	Risetime degradation	≤50 ns
	Falltime degradation	≤50 ns
	Signal-to-noise ratio at "zero beat"	
SIG GEN OUT	CW Mode	
	Power level	From 0 to -100 dBm
	Power level accuracy	Within ±1 dB of dial reading
	Frequency response	1010-1110 MHz
	Pulse Mode	
	Power level	0 to -100 dBm
	Power level accuracy	Within ±1 dB of dial reading
	Frequency response	1010 to 1110 MHz
	Pulse width	0.45 ± .025 μs
	Risetime	30-100 ns
	Falltime	50-150 ns

Table 11. Reference Data for the RF Calibration Test Set (Cont'd)

ITEM	CHARACTERISTIC	CAPABILITIES AND LIMITATIONS
SIG GEN OUT (Cont'd)	Sweep Mode	
	Power level	0 to -100 dBm
	Power level accuracy	Within ± 1 dB of dial reading
	Maximum sweep width	1010-1110 MHz minimum
	Amplitude flatness	±0.5 dB from 1010-1050 MHz or from 1070-1110 MHz
	Minimum sweep width	10 MHz maximum

I. PRINTED-CIRCUIT BOARD TESTER

1. General

This subsection provides the information on installation and operation of the Printed-Circuit Board Tester.

2. Functional Description

The Printed-Circuit Board Tester is an all solid-state digital test set that provides a Go/No-Go test for all the printed-circuit boards or "cards" used in the NATO IFF/SIF equipment manufactured by Cardion Electronics.

The Printed-Circuit Board Tester contains a pulse generator board used to generate clocks and pulses which are used to simulate inputs to the cards under test, and a sensor board which is used to indicate a Go/No-Go condition of the card under test.

3. Description of Unit

The Printed-Circuit Board Tester is a platform mounted unit. All operating controls and test points are located on the front panel. The power connector is located on the rear of the case. The line fuses are located towards the rear of the chassis and the blown-fuse indicators are located on the front panel.

The Printed-Circuit Board Tester consists of two plug-in printed-circuit card assemblies, 31 plug-in printed-circuit program cards and a power supply module. The power supply module generates all DC voltages and contains a single plug-in printed-circuit card.

All of the printed-circuit cards are provided with extractor lifts to facilitate removal. All alignment and test points are accessible without extending the cards.

4. Reference Data

Reference data for the Printed-Circuit Board Tester is given in Table 12.

5. Equipment Supplied

The equipment supplied with the printed-circuit board tester is as follows:

1 power cable

1 technical manual

6. Equipment Required but Not Supplied

The equipment required for a complete operational installation of the printed-circuit board tester, but not supplied with the printed-circuit board tester, is listed in Table 13.

Table 12. Reference Data for the Printed-Circuit Board Tester

Item	Characteristics	Capabilities and Limitations
Input Power	Line Voltage	220 VAC ± 10% or 115 VAC ± 10%, 30 watts
Test Sequence	DC Level SELECT	Ground
Test Pulse	Polarity	Positive
	Amplitude	3 volts nominal
	Risetime	0.2 μs maximum
	Falltime	0.2 μs maximum
Selected Clock	Amplitude	3 volts nominal
	Frequencies	10 MHz nominal 5 MHz nominal 1 MHz nominal 0.5 MHz nominal

Table 13. Test Equipment Required but not Supplied with the Printed-Circuit Board Tester

Quantity	Name	Designation	Required Use
1	Multimeter	AN/USM-311 or equivalent	Voltage check
1	Oscilloscope	AN/USM-281 or equivalent	Waveform observation

MP MASTER
MA23527